Shell Iraq Petroleum Development B.V.

Majnoon Field

Probabilistic Seismic Hazard Assessment

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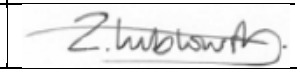
		Signature			
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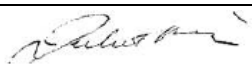
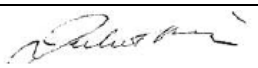
		Signature			
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Appendices

Appendix A

Geology & Tectonics

Appendix B

Earthquake Catalogue

Executive Summary

A seismic hazard assessment has been undertaken for Shell Iraq Petroleum Development BV to provide seismic design parameters for the development of the proposed Majnoon oilfield in Southern Iraq. The seismic hazard assessment in this report draws on the review of the geology and tectonics of the region, including information obtained during a detailed literature search.

Tectonic Setting

Southern Iraq is located on the North eastern edge of the stable Arabian Plate. However, the Majnoon site is exposed to a higher rate of seismic activity than most of the country, due to its proximity to the active Zagros Fault structures located approximately 100-200km north-east of the site.

Capable Faulting

A detailed literature review has revealed that capable faults, i,e, faults which have the potential to produce ground rupture associated with earthquakes, are unlikely to be present at the site.

Earthquake Catalogue

An earthquake catalogue of historical and recent instrumentally recorded earthquakes has been compiled from a wide range of sources. The earthquakes in the catalogue date back to 300 BC and extend to May 2011 AD. The catalogue has been compiled for an area bounded by Latitude 25° to 37.5°N and Longitude 42° to 55°E.

Seismic Ground Motion Hazard Assessment Methodology

The seismic ground motion hazard at the site has been determined using probabilistic seismic hazard assessment methodology. The probabilistic seismic hazard assessment has been undertaken using areal source zones, with the exception of the Zagros Foredeep fault structure, which has been modelled as a linear fault source.

Seismic Hazard Results

Horizontal and vertical uniform hazard response spectra (UHRS) are presented for return periods of 475 and 2475 years, and shear wave velocity profiles of 180 and 760m/s.

The seismic hazard has been de-aggregated to define characteristic earthquakes for the site. The UHRS are extended to periods of 10 seconds based on the de-aggregation results. Horizontal and vertical response spectra are presented for 0.5%, 2, 5%, 7%, 10% and 20% damping levels.

An equivalent Uniform Building Code (UBC, 1997) spectrum is also presented as per client's request. However, as the UBC (1997) has been superseded by the International Building Code (IBC, 2009), an IBC (2009) defined spectrum is also presented.

1 Introduction

1.1 General

Shell Iraq Petroleum Development B.V (Shell) is currently planning to develop the Majnoon oilfield in Southern Iraq. The location of the Majnoon site is shown in Figure 1 (31.075˚N and 47.619˚E). Arup was previously commissioned by Shell to carry out a preliminary seismic hazard desk study for the Majnoon site (Arup, 2010). The 2010 report presented the findings of the seismic hazard desk study based on a review of available information regarding the geology, tectonics, seismicity and hazard studies for Iraq and in particular for the Majnoon site. This study suggested that high uncertainty exists in the level of seismic hazard for this particular region.

Shell, therefore, require a thorough, design-level assessment and quantification of the seismic hazard for the Majnoon site. This report presents the results of a site specific and detailed Probabilistic Seismic Hazard Assessment (PSHA) based on a review of currently available information regarding the geology, tectonics, seismicity and hazard studies for the area.

1.2 Project Scope

Arup was appointed by Shell under our existing Call-off contract No. 50000479, based on our Proposal letter of 6th May 2011, to undertake a site specific PSHA study for the proposed project. The PSHA outputs as defined for this work are as follows:

- Horizontal uniform hazard response spectrum (UHRS)
- Vertical UHRS
- UHRS at bedrock ($V_{s,30}$ = 760m/s, IBC Site Class = SB)
- UHRS at soil surface (dependant on local $V_{s,30}$ profile)
- UHRS for two return periods: 475 years and 2,475 years
- De-aggregated results for horizontal UHRS at PGA, 0.2 and 1 second periods for each aforementioned return periods
- Comparison with code spectra

2 Tectonic and Geological Setting

A detailed account of the tectonic and geological setting of the site has been given in the Preliminary Seismic Hazard Study report (Arup 2010). However, since that report was issued, additional works on the geology and tectonics of Iraq have been published by a number of authors and researchers. Therefore, a revised account of the tectonic and geological setting of the site, based on the recently sourced references, is presented in Appendix A. In the following sections, the key points related to the tectonic and geological setting of the site are summarised.

2.1 Tectonic Setting

2.1.1 General Tectonic Setting

- The site is located at the north eastern edge of the Arabian plate, the majority of which is a stable continental region. (Figure A4)
- The site is located just south of the boundary between the Arabian plate and the Eurasian Plate, near the Zagros Region. (Figure A2)
- The Zagros Region is an active fold-thrust belt dominated by the continental collision of the Arabian and the Eurasian plates, which occurs in a north-north-western direction. (Figure A3)

2.1.2 Tectonic Setting of Iraq

2.1.2.1 Palaeostructural elements in Iraq

- A number of Precambrian (4500 to 543 million years ago) faults and folds have been identified in Iraq on the basis of geophysical (gravity and magnetic) data.
- Interpreted seismic profiles and observed seismicity suggest that these fault systems in the Mesopotamian Basin where the site is situated, have largely ceased being active in the Cenozoic (65 million years ago to present)
- The reactivation and seismogenic potential of these palaeo-faults as relates to the area under investigation is thus considered negligible, and they are not considered as discreet seismogenic zones in this study.

2.1.2.2 Phanerozoic tectonic features

- The Arabian Plate can be divided into the Arabian Shield (an area of Precambrian (4500 to 543 million years ago) outcrops which was uplifted and exposed in the Phanerozoic (543 million years ago to present) and the Arabian Shelf (an eastward-deepening basin which contains up to 14km of sediment).
- The Arabian Shelf in Iraq can be divided into an unfolded area (or stable shelf), which contains the Mesopotamian Basin where the site is situated, and a folded zone (or unstable shelf).
- The Mesopotamian Basin forms a broad, flat-lying area located between Central Iraq and Kuwait, and is covered by loess and Quaternary fluvial-plain deposits of the Tigris-Euphrates river system.

- The western margin of the basin is bounded by the NNW-SSE trending Abu Jir fault zone (Figure A9).
- Based on the analysis of seismic profiles, it appears that the faults of the Abu Jir zone, and other basement lineaments further to the northeast, terminate at the top of the Late Cretaceous (145 to 65 million years ago), with no obvious signs of reactivation in the Cenozoic (65 million years ago to present) for the most part of the Mesopotamian Basin.

Structural Cross-Sections (Figure A11-A13)

- Structural cross-sections show a thick sequence of Cretaceous (145 to 65 million years ago) to recent sediments has accumulated in the Mesopotamian Basin.
- Anticlines and horsts, thought to be related to long-lived palaeostructures, lie beneath undeformed or gently deformed Neogene (23 to 2.5 million years ago) cover.
- This suggests that these tectonic features are not related to the more recent Zagros Mountains (as they do not seem to affect the mountain's contemporaneous Neogene (23 to 2.5 million years ago) sediments), and are thus taken to be the product of an earlier compression stage.

2.1.2.3 Active Faulting in Site Location

- The definition of active faults for the purposes of this study is taken from Shell's Seismic Design and Engineering Practice Manual (DEP) 34.00.01.10-Gen, titled "Earthquake Design for Onshore Facilities", Table 14: In regions of low seismicity, an active fault is classified as that which exhibits geological evidence of Quaternary (2 million years to the present) displacement or that associated with contemporary seismic activity.
- The above interpretation and analysis of geological and structural data suggests that the likelihood of occurrence of active faults at the site is low.
- The above assessment of the occurrence of active faults at the site could be verified by undertaking a geo-morphological interpretation of appropriate remote sensing data.

2.2 Geologic Setting

2.2.1 Geology of Iraq and the Mesopotamian Basin

- The surface geology of Iraq largely reflects its geomorphology, with the youngest sediments (Neogene (23 to 2.5 million years ago) and Quaternary (2.5 million years to present)) occupying the central depression (Mesopotamian Basin), and older strata, up to Palaeozoic age (542 to 251 million years ago), exposed in the flanks.
- The Mesopotamian Basin is an extensive lowland that covers large parts of central and southern Iraq. It has been, from the Plio-Pleistocene (2.5 million years ago) to the present, a subsiding sedimentary basin where thick Quaternary (2.5 million years to present) deposits have accumulated in a complex system of river channels, levees and marshes, flanked on both sides by alluvial fans.

2.2.2 Site Geology

- A number of cone penetration tests (CPT) have been undertaken at the site. These suggest that the site is underlain by a thick sequence (>30m) of unconsolidated silts, sands and clays of alluvial and marsh origin. Discrete layers, up to 2m thick, also occur, which probably represent levees.
- These Quaternary deposits are expected to overlie a thick pile (>5km thick) of Mesozoic and Cenozoic sediments.
- The site's low elevation, and developed drainage system suggest that the groundwater table is high. This has been confirmed by some preliminary ground water level measurements, ranging from 2 to 6m below ground level (bgl).

2.2.3 Basin Shear Wave Velocity Profiles

Despite the low level of activity in the Mesopotamian Basin, the deep sedimentary layers in this zone can be expected to amplify earthquake ground motions. Gok *et al.* (2006) determined the crustal structure velocity in Iraq from receiver functions and surface wave dispersion. The results of their study are presented in Figure 2. This shows that a sedimentary layers extending down to a depth of about 8 km are expected to exist at the Majnoon Site.

2.3 Site Geology

- The Mesopotamian zone is covered by quaternary alluvial deposits: fluvial clastic deposits exist at the location of the proposed development. These sediments are likely to be of variable nature and density, as a result of the depositional processes.
- Cone penetration tests (CPT) at the site suggest that the site is underlain by a thick sequence (>30m) of unconsolidated silts, sands and clays of alluvial and marsh origin. Discrete layers, up to 2m thick, also occur, which probably represent levees.
- These Quaternary deposits are expected to overlie a thick pile (>5km thick) of Mesozoic and Cenozoic sediments.
- The site's low elevation, and developed drainage system suggest that the groundwater table is high. This has been confirmed by some preliminary ground water level measurements, ranging from 2 to 6m below ground level (bgl).

2.3.1 Site classification

The following geotechnical information has been made available to Arup for assessing the site classification:

- 37 no. cone penetration testing (CPT) logs (received by email on 3rd May 2011) at different facilities including: Central Processing Facility (CPF), Degassing Station 1 (DS1), Degassing Station 2 (DS2), Jetty (JTY), Pipeline (EPL)
- Fugro's interpretation of soil types for CPF based on CPT (received by email on 3rd May 2011)

- Ground Water Level information from 3 sites: CPF, DS1 and DS2 (Measurements from first week of May, received by email on 12th May 2011)
- Limited laboratory test data including Atterberg Limits, Particle Size Distribution (PSD) and soil unit weights (MOSTAP sample testing by Fugro, received by email on 3rd May 2011)

The international seismic codes (IBC, 2009) require that the site-classification is assessed based on an average shear wave velocity over the top 30m of soil profile, often referred to as $V_{s,30}$ profile. The $V_{s,30}$ profile for the site may be determined through the following equation:

$$V_{s,30} = \frac{30}{\sum_{i=1,N} \frac{h_i}{V_i}}$$

Equation 1 (ASCE 7-10)

Where h_i is the thickness of the individual layers.

Direct measurements of shear wave velocity are not available for the present site, therefore correlations with in-situ test results have been used. Relationships by Rix and Stokoe (1991) for cohesionless soils and Mayne and Rix (1993) for cohesive soils were used to estimate the shear wave velocity profile of the ground.

The average $V_{s,30}$ values, based on CPT data for each facility within the Majnoon site, are shown in the following table and the average value of shear velocity is about **193 m/s**. Therefore, the local conditions at the site may be characterised to be at the boundary of site class D and E, which is defined as having an average shear wave velocity of between 180 m/s and 360 m/s (Dense Sand or Stiff Clay) and shear wave velocity of less than 180 m/s (Soft Soil Profile) respectively.

Table 1 Summary of shear velocities for the Majnoon site

location	**$V_{s,30}$ (m/s)**
CPF	194.0
DS1	213.5
DS2	199.5
JTY	165.0
MJ	199.0
EPL	186.0

3 Seismic Hazard Review of Southern Iraq

3.1 General

At the present time, there are no well established seismic codes of practice in Iraq. It is therefore usual practice to design facilities according to international codes (e.g. EC8, UBC, IBC etc.)[1]. This section of the report presents a review of seismic hazard and relevant codes with advice on the required hazard level and seismic hazard assessments performed for Southern Iraq.

Only a limited number of probabilistic seismic hazard studies are available in the public domain for the Iraqi region. Earlier studies by Alsinawi and Ghalib (1975b), Alsinawi and Al Moosawi (1980), Puttonen and Varpasuo (1982) and Fahmi and Al Abbasi (1989), amongst others, produced seismic zoning maps for the Iraq region in terms of earthquake intensity. Recent earthquake hazard studies for Iraq and the surrounding region include studies by Fahmi and Al Abbasi (1989), Global Seismic Hazard Program (GSHAP), Alsinawi and Al-Qasrani (2003) and Ameer *et al.* (2005). The latter however, does not provide ground-motion parameters for uniform hazard levels at particular return period but return period-magnitude plots for the various sources contributing to the hazard in the region.

Details of the existing probabilistic seismic hazard studies for the region are provided in the following sections.

3.2 Fahmi and Al Abbasi (1989)

Fahmi and Alabbasi (1989) reviewed the earthquake catalogue and assessed the risk of earthquakes in Iraq. As part of the study they have assessed the maximum observed intensities using an earthquake catalogue from 1905 to 1984. This is shown in Figure 3. The figure indicates the maximum observed intensity at the present site during this period was 5-6. Fahmi and Al Abbasi (1989) suggest this intensity level is equivalent to a PGA of 0.01 to 0.05g.

3.3 GSHAP study by Tavakoli & Ghaforty-Ashtiany (1999)

GSHAP was launched in 1992 with the objective of producing seismic hazard maps of the world using probabilistic methods. The maps were derived for PGA values corresponding to a 475 yr return period (i.e. 10% probability of exceedance in 50 years). The seismic hazard model is presented in Figure 4 and the PGA seismic hazard map derived by the GSHAP for the Middle East region is presented in Figure 5. The GSHAP study indicates that the maximum PGA value assigned to the Majnoon site for a 475 year return period varies from 1.6 to 2.4 m/s^2 (0.16 to 0.24g). However, it should be noted that the project used local seismic hazard studies that were then integrated into regional maps and afterwards into a global map.

[1] Please note that UBC has been superseded by the International Building Code (IBC, latest version 2009)

The northeast of the Arabian Peninsula, including Iraq, was one of the few areas not covered by the individual studies used to derive the regional map. For this region, the hazard was mapped by simulating the attenuated effect of the seismic activity in the Dead Sea fault area and in the Zagros region (Grunthal *et al.*, 1999). Therefore, the results should be treated with caution as indicated by Grunthal *et al.* (1999).

3.4 Alsinawi & Al-Qasrani (2003)

Alsinawi & Al-Qasrani (2003) carried out a probabilistic seismic hazard study for Iraq, using an earthquake catalogue of more than 1000 earthquakes that occurred in Iraq and adjacent areas during the period 1900-1988. The seismic source zonation used by Alsinawi & Al-Qasrani (2003) considered four area sources and five line sources modelling the seismicity associated with the Zagros and Tauros thrust zones and three NNE-SSW fault systems. The ground-motion equation of Esteva (1974) for Western North America was used to model the distribution of ground motions.

Although the publication indicates that hazard maps for 25, 50, 100 and 200-year return period have been derived, only the hazard map for 100- year return period is reported (Alsinawi & Al-Qasrani, 2003; Alsinawi, 2006). Figure 6 shows the resulting hazard map for PGA and for a return period of 100 years (i.e., 40% probability of exceedance in 50 years). This indicates a PGA value of about 1.0-2.0 m/s^2 (0.1-0.2g) for the Majnoon site.

3.5 Ameer, Sharma, Watson and Alsinawi (2005)

Ameer *et al.* (2005) carried out a seismic hazard study for Iraq, using an earthquake catalogue of more than 1000 earthquakes that occurred during the period 1905-2000 in Iraq and surrounding areas. Their study considered thirteen seismic zones (S1 to S13) (Figure 7) based on the tectonic setting and distribution of seismicity. The maximum regional magnitude estimated for the entire Iraq region was M_S = 7.9. Although the Ameer *et al.* (2005) study does not derive hazard maps for particular ground-motion parameters and return periods in Iraq, it provides return-period magnitude curves for each of the 13 sources, to be used as input in hazard analyses for the region. These curves are shown in Figure 8.

It shows that the return period of an earthquake of M_S=6.0 in the zones near the site (S6, S7, S12) varies from about 100 to 330 years. Area zone S12 is associated with a maximum magnitude of M_S = 7.0, which has a return period of about 100 years. Ameer *et al.* (2005) assigned maximum magnitudes between M_S of 7.5 and 8.0 to the area zones that attempt to represent the seismicity associated with the Zagros and Tauros thrust zones (S1, S8, S2 and S10). Except for S8, the return period of a M_S=6.0 events in these zones is less than about 50 years.

3.6 United Facilities Criteria (UFC)/USGS

UFC Structural Engineering manual, Document No. 3-301-01, provides requirements for structures designed and constructed for the US Department of Defence (DoD). The manual provides seismic hazard values for various locations outside of United States of America, including Baghdad and Basra in Iraq. These

values are believed to originate from the United States Geological Service (USGS) seismic hazard website (geohazards.usgs.gov/secure/designmaps/ww/),

The USGS international seismic hazard map facility provides seismic hazard values based on a number of published studies. For the Majnoon site, the USGS map facility provides an estimate of the seismic hazard based on the GSHAP. A brief description of how the GSHAP values are modified is provided below.

3.6.1 Modification of GSHAP values for USGS website

As detailed previously, the GSHAP (1999) map has been determined for peak ground acceleration (PGA) at a 10 percent probability of exceedance (475 year return period). However, the USGS seismic hazard map facility converts this to S_S and S_1 values through an approximation method. The approximation method is illustrated below:

- Determine GSHAP values for a particular location
- Multiply by a constant factor of 2 to approximate a PGA with a 2 percent probability of exceedance in 50 years
- Multiply by 2.5 to estimate S_S
- Multiply by 1.0 to estimate S_1

This methodology for extrapolating 10% PGA values to 2% in 50 year PGA values and then approximating PGA to an ASCE type of spectra using global factors (S_S = 2.5 x PGA and S_1 = 1 x PGA), make no consideration of the area under consideration, and as such contains significant uncertainty.

The S_S and S_1 values obtained from the USGS seismic hazard map facility for the Majnoon site and Basra are shown in Table 2:

Table 2: Seismic Design Values from USGS (Modified GSHAP values to provide 2% in 50 year hazard values)

Location	Source	Latitude	Longitude	Short Period, S_S (m/s^2)	One-Second, S_1 (m/s^2)
Majnoon Site	GSHAP	31.075	47.619	11.2	4.51
Basra	GSHAP			9.52	3.83
Basra	UFC			9.61	3.83

3.7 International Organisation for Standardisation

International Organisation for Standardisation (ISO) has published an international standard on the specific requirements for offshore structures, including Seismic Design Procedures and Criteria, as described in ISO 19901-Part 2. Within this document, guidance has been provided on the expected seismic accelerations for offshore areas around the world. Although the Majnoon site is an on-shore facility, it is in close proximity to the Arabian Gulf and therefore the values can be considered to be indicative of the expected hazard at the present site. The seismic hazard design map from ISO is shown in Figure 9 and seismic hazard values for Iraqi coastline at the Arabian Gulf are shown in Table 3.

Table 3: ISO 19901-Part 2 Seismic Hazard at 5% damping for 1,000 year return period

Location	Source	Short Period, S_S (m/s^2)	One-Second, S_1 (m/s^2)
Iraqi Arabian Gulf coastline	ISO	2.5	1.0

It may also be noted here that ISO map is based on a return period of 1,000 years, i.e. 5 percent probability of exceedance in 50 years. ISO Annex B Note 2 states that:

"*It is recognised that there is some uncertainty in the values given in this annex. This is due to lack of complete understanding or knowledge (epistemic or Type II uncertainties). The requirements of the standard are such that a site-specific assessment of the accelerations is required for any structure in which failure would have significant consequences and in which seismic considerations can affect the design*".

Therefore, the code recognises that a site specific assessment should be used to derive seismic hazard that explicitly account for uncertainties.

3.8 Conclusions

A summary of seismic hazard results from different probabilistic seismic hazard studies and building codes has been presented. The probabilistic seismic hazard studies reviewed herein provide expected peak ground acceleration (PGA) values for uniform hazard levels at Majnoon site for 475-yr return period (i.e. 10% probability of exceedance in 50 years) and 100-yr return period (i.e. 40% probability of exceedance in 50 years). The PGA values estimated are 1.6-2.4 m/s^2 for a 475-yr and 1.0-2.0 m/s^2 for a 100-yr, based on the GSHAP and the Alsinawi and Al-Qasrani (2003) studies, respectively. It should be noted that no studies present a detailed probabilistic seismic hazard analysis for the 2,475 yr return period. A summary of hazard parameters from studies reviewed in this section is presented in Table 4.

Table 4: Summary Table of Hazard Results

Spectral Period	Return Period (years)	Alsinawi & Al Qasarni (2003) (m/s^2)	USGS (GSHAP)* (m/s^2)	ISO (m/s^2)	UFC (GSHAP) (m/s^2)
PGA	100	1.0 to 2.0	-	-	-
PGA	475	-	1.6 to 2.4	-	-
PGA	2,475	-	4.5	-	-
0.2-sec	1,000	-	-	2.5	-
0.2-sec	2,475	-	11.2	-	9.6 (Basra)
1.0-sec	1,000	-	-	1.0	-
1.0-sec	2,475	-	4.5	-	3.8 (Basra)

It may be noted that the level of hazard varies across different studies which illustrates the high levels of uncertainties associated with each study and hence provides low levels of reliability. Therefore, it is necessary to perform a site-specific seismic hazard assessment which develops recurrence parameters based on a composite catalogue and a uniform seismic source model, whilst incorporating aleatory and epistemic uncertainties through a probabilistic seismic hazard assessment approach.

4 Earthquake catalogue

4.1 General

The seismicity of Iraq and the adjacent region of Western Iran is primarily concentrated along the Zagros Fold-Thrust Belt, which is an approximately 1000 km zone of compression between the colliding Eurasia and Arabian continental plates. However, local deformation has also resulted in some earthquake events in the Mesopotamian Basin and Persian Gulf.

Modern instrumentally recorded seismicity delineates the location of the main tectonic units in the region, including the High Zagros, the Simply Folded Belt and the Zagros Foredeep. The region is characterised by the occurrence of M<6.0 events, although historical and early instrumental records document the occurrence of large earthquakes (M>7.0) within the Zagros Fold-Thrust Belt (Ambraseys & Melville, 1982; Ambraseys *et al.*, 1994; Ambraseys & Jackson, 1998) and some detailed studies have assigned historic events to particular faults in Zagros (Berberian, 1995; Ambraseys & Jackson, 1998). During the last century, the largest event recorded was an earthquake of magnitude M_W=7.4 on 23 January 1909 in the High Zagros zone (Ambraseys, 2001).

Documentation of earthquake activity in Iraq and Iran dates back over 2000 years, although the quality and the availability of secondary sources for historical earthquakes are variable. The following sections describe the compilation of an earthquake catalogue for the seismic hazard assessment using historical, early and modern instrumental earthquake locations and magnitudes. The study area for compiling the earthquake catalogue is bounded by Latitudes 25°N – 37.5°N and Longitudes 42°E – 55°E.

4.2 Data Sources

The catalogue has been compiled for the period from 300 BC to 2011 AD. , including both historical and instrumental earthquake records. The sources of the earthquake data are described in the following sections. Figure 10 shows the entire earthquake catalogue compiled in this study in terms of moment magnitude (M_W), including mainshocks, foreshocks and aftershocks. Table 5 provides an overview of the earthquake data sources used in the compilation of the final composite catalogue.

Table 5: Earthquake data sources used in the compilation of the composite catalogue

Source	Region	Time coverage	Completeness
GSHAP (1999a); Midzi *et al.* (1999) *	East Africa Rift and Arabian Peninsula Lat 40°S - 25°N Lon 10°E - 55°E	627 - 1997	1900-1994 $M_S \geq 5.0$
NOAA/NGDC #	Global	2150BC-1994AD	Significant earthquakes
Ambraseys & Melville (1982)	Iran and neighbouring	3rd millennium BC –1979	

Source	Region	Time coverage	Completeness
	regions		
Ambraseys, Melville & Adams (1994)	Egypt, Arabia & Red Sea	184 BC – 1992AD	
IIEES catalogue from GSHAP (1999b); Tavakoli & Ghafory-Ashtiany (1999)	Iran and neighbouring regions Lat 25°N - 40°N Lon 44°E - 63°E	400BC-1996AD	
Ambraseys (2001)	Eastern Mediterranean and Middle East Lat 10° to 44°N Lon 18° to 70°E	1900-1999	"the available 20th century data for the whole region are almost complete for moderate earthquakes or greater"
Ambraseys & Jackson (1998)	Eastern Mediterranean	464BC-1995	Compilation of events with surface faulting, therefore completeness not applicable
Engdahl & Villasenor (2002) Centennial Catalogue ^	Global	1900-2002	1900-1963 M7.0 1964-1999 M5.5
Engdahl-Hilst-Buland (EHB) Bulletin %	Global	1960-2008	
International Seismological Centre (ISC) catalogue	Global	1900-2008	
National Earthquake Information Centre (USGS/NEIC)	Global	1973-2011	
Global CMT Catalogue, formerly Harvard catalogue "	Global	1976-2011	
IIEES catalogue (IIEES, 2010)	Iran and neighbouring regions	1900-2011	1900-2011 mb ≥ 5.0

Notes:

* Homogenised to M_S; composite catalogue with duplicates removed

Known to contain many duplicates ("uncritical" compilation of data) and grossly mis-located events/ overestimated magnitudes

^ Update of Engdahl *et al.* (1998)

% Expands the Engdahl & Villasenor (2002) catalogue. Improved ISC hypocenter determinations

" Used to obtain MW estimates and focal mechanism solutions

A brief summary of the main sources used for compiling historical, early instrumental and modern instrumental catalogues is presented below.

4.2.1 Historical Seismicity

The historical catalogue includes recorded earthquakes between 300 BC and 1900 AD. The catalogue has been compiled from the following sources, in order of priority:

1. Ambraseys & Jackson (1998),
2. Ambraseys, Melville & Adams (1994);
3. Ambraseys & Melville (1982),
4. Midzi *et al.* (1999),
5. IIEES GSHAP catalogue, although all entries were found to be covered by the first two sources, and
6. NOAA/NGDC catalogue

Ambraseys & Jackson (1998) list events associated with surface faulting. The association with mapped faults confirms the location determined in earlier studies, but since this study does not involve any reassessment of locations, the two-digit locations of Ambraseys & Melville (1982) are retained. For ten of the earliest events, the magnitude is given by Ambraseys and Jackson (1998) as L (large, $7.0 \leq M_S \leq 7.8$) and M (medium, $6.0 \leq M_S \leq 7.0$). For these events, magnitude value $M_S=7.4$ and MS=6.5 have been assumed, respectively, based on the rationale that an uncertainty of $\pm M_S$ is at least as acceptable as the values listed in other historical catalogues.

The very old, "biblical" entries (e.g. Sodom & Gomorrah 2150BC, Jericho 1250 BC) from the NOAA catalogue were removed as being too unreliable.

The distribution of earthquake epicentres included in the historical part of the catalogue is shown in Figure 11.

4.2.2 Early Instrumental Seismicity

The early instrumental part of the catalogue includes earthquakes recorded between 1900 and 1964. It includes earthquakes of magnitude greater than 4.0 within the study area. The catalogue has been compiled from the following sources, in order of priority:

1. Ambraseys (2001)
2. Ambraseys & Jackson (1998)
3. Engdahl & Villasenor (2002)
4. Ambraseys & Melville (1982), and Ambraseys, Melville & Adams (1994)
5. GSHAP East African Rift
6. IIEES 20th century catalogue (IIEES website)
7. IIEES GSHAP catalogue
8. ISC catalogue (ISS, Gutenberg and Richter and other sources)
9. NOAA/NGDC catalogue

Ambraseys (2001) has provided estimates of Log(M0) and hence MW. As noted above, Ambraseys & Jackson (1998) have listed events associated with surface faulting and the two-digit locations of Ambraseys & Melville (1982) are retained.

For the Ambraseys & Melville (1982) catalogue, the choice between macroseismic and instrumental location has been made based on the quality associated with each of these records. If the quality index is the same in both cases the instrumental location is preferred.

The Engdahl & Villaseñor (2002) catalogue is mainly used to obtain improved locations of 20th century events. In cases where the information provided in this catalogue is conflicting with that presented in Ambraseys & Melville (1982) and/or Ambraseys, Melville & Adams (1994), the recomputed instrumental epicentre of Engdahl & Villaseñor (2002) is adopted. The magnitude estimate, however, is taken from the regional studies of Ambraseys and co-workers, which take into account macroseismic information and are therefore deemed more reliable than the global catalogue of Engdahl & Villaseñor (2002).

The distribution of earthquake epicentres included in the early instrumental part of the catalogue is shown in Figure 12.

4.2.3 Modern Instrumental Seismicity

The modern instrumental part of the catalogue includes earthquakes recorded between 1964 and 2010. The catalogue includes earthquakes of magnitude greater than 3.0 within the study area. The catalogue has been compiled from the following sources, in order of priority:

1. Ambraseys (2001)
2. Engdahl & Villaseñor (2002)
3. Ambraseys & Jackson (1998)
4. Ambraseys & Melville (1982), and Ambraseys *et al.* (1994)
5. EHB Bulletin (Engdahl-Hilst-Buland Bulletin)
6. ISC catalogue,
7. Global CMT Catalogue
8. GSHAP catalogue
9. Centre Seismologique Euro-Mediterranean (CSEM)
10. NEIC catalogue
11. International Institute of Earthquake Engineering Seismology (IIEES, Iran)
12. 20th century catalogue (IIEES website)
13. Iraqi Meteorological and Seismology Organisation
14. Kandili Observatory and Earthquake Research Institute, Bogazici Univ. Istanbul, Turkey

For events listed in both the Ambraseys & Jackson (1998) and Engdahl & Villaseñor (2002), the magnitude determination of Ambraseys & Jackson (1998) in terms of M_S is adopted unless Engdahl & Villaseñor list an M_W value. The

recomputed locations of Engdahl & Villaseñor are preferred to the one-digit precision Ambraseys & Jackson (1998) locations when consistent, but in case of disagreement between the two catalogues, the Ambraseys & Jackson (1998) locations (which are associated with observed fault ruptures) are preferred. Some of the magnitude choices for events selected from the ISC catalogue were revised (e.g. choose M_W when available, rather than other magnitude scale). The assumption was made that there are no duplicates within either the ISC or the NEIC catalogue. In a number of cases, the magnitude listed in the NEIC catalogue (e.g. Harvard or USGS M_W) is adopted, but keeping the ISC hypocentral location. When all locations are consistent, the NEIC entry is adopted if it includes an M_W determination.

The catalogue used in the GSHAP study for Iran seems to include a large number of duplicate entries (possibly from merging of two different sources), often listing two events with almost identical locations and similar magnitudes, whereas the ISC catalogue and the IIEES website list only one such event.

The IIEES website catalogue tends to be based on NEIC locations. ISC locations converge more often (i.e. a depth is given rather than 33 or 10 km), and ISC magnitudes are more frequently given in terms of M_S. Therefore, ISC entries are preferred unless the IIEES website catalogue entry is different from NEIC, in which case the local IIEES parameters are used.

CMT moment magnitude estimates were also collected and incorporated into the catalogue.

The distribution of earthquake epicentres in the modern instrumental earthquake data are shown in Figure 13.

4.3 Catalogue Processing

4.3.1 Removal of Duplicates

Since the earthquake catalogue was derived from several data sources, a number of events are associated with multiple listings. The following criteria were adopted to remove duplicates:

Quality

This criteria relates to quality of documentation of the catalogue compilation process. The studies of Ambraseys & Jackson (1998) Ambraseys, Melville & Adams (1994); Ambraseys & Melville (1982) are preferred sources of historical data. Similarly, the EHB and ISC catalogues are preferred sources of instrumental data. When an event was reported in both the EHB and ISC catalogues, data from the former is preferred due to the improved travel-time model and more refined location procedures (Engdahl *et al.*, 1998) which provide morerefined locations than those of the ISC.

Completeness

When two catalogue entries were available that could be associated with the same event, the entry that was more complete was retained. Entries with a depth value were preferred to those with unknown or default depth values.

Magnitude scale

Preference is given to entries that minimise the number of steps necessary to obtain an estimate of the moment magnitude (M_W) for the event. The order of preference in terms of magnitude scales is therefore: moment magnitude (M_W), surface-wave magnitude (M_S), body-wave magnitude (m_b), local magnitude (M_L) and other magnitudes.

After removal of duplicates, the catalogue consists of 11,330 events.

4.3.2 Aftershocks and Foreshocks Removal

To carry out a probabilistic analysis for seismic hazard using a Poissonian process, all earthquake events must be statistically independent, and therefore foreshocks and aftershocks, which are not independent of their parent event must be removed from the catalogue.

The windowing procedure of Gardner and Knopoff (1974), based on Southern Californian earthquakes, was used to remove aftershocks. The procedure relates the maximum possible distance and time of an aftershock to the main shock magnitude.

After removal of foreshocks and aftershocks, the catalogue consisted of 4,773 events. Figure 14 shows the effect of removal of fore/aftershocks based on magnitude bins.

The final catalogue is presented in Appendix B.

4.4 Magnitude Scale

The moment magnitude scale (M_W) was chosen as the uniform magnitude scale for the seismic hazard assessment. Therefore the body-wave magnitude (m_b), surface-wave magnitude (M_S) and local magnitude (M_L) values were converted.

For the events taken from the Ambraseys (2001) catalogue, the Log M_o values reported were used to estimate M_W values. For the instrumentally recorded earthquakes, M_W values as reported in the Havard CMT catalogue were used when available, which was generally the case for $M \geq 5.0$ events recorded after 1976.

A number of magnitude conversions were investigated for suitability against recorded earthquakes with multiple magnitude scale entries (for e.g. Ambraseys, 1990, Ambraseys, 2001 etc). The equations developed specifically for the Euro-Mediterranean and Middle East region by Akkar *et al.* (2009) provided the best-fit to the catalogue. The process has been summarised in Figure 15. The Akkar *et al.* (2009) magnitude conversions are presented here:

$$M_w = 1.104(\pm 0.03)m_b - 0.194(\pm 0.16) \quad \text{for } 3.5<m_b<6.3 \quad \text{Equation 2}$$

$$M_w = 0.953(\pm 0.04)M_L + 0.422(\pm 0.21) \quad \text{for } 3.9<M_L<6.8 \quad \text{Equation 3}$$

$$M_w = 0.764(\pm 0.04)M_d + 1.379(\pm 0.20) \quad \text{for } 3.7<M_d<6.0 \quad \text{Equation 4}$$

$M_w = 0.571(\pm 0.02)M_s + 2.484(\pm 0.11)$ for $3.0<M_S<5.5$ Equation 5a

$M_w = 0.817(\pm 0.03)M_s + 1.176(\pm 0.18)$ for $5.5 \leq M_S<7.7$ Equation 5b

4.5 Depth Distribution

About 35% of the catalogue entries have either unreported depths (0 km) or catalogue default depths (10 or 33km).

Engdahl *et al.* (2006) indicate that most earthquakes in the Zagros region occur in the upper crust (Figure 16). In the Zagros Mountains nearly all earthquakes are confined to the upper crust (depths <20 km). Figure 17 to Figure 20 show depth distribution of earthquakes from the composite catalogue compiled during this study.

In north-central Iran, along the Alborz mountain belt, seismic activity occurs primarily in the upper crust but with some infrequent events in the lower crust.

4.6 Catalogue Completeness

The statistical completeness of the earthquake catalogue has been assessed using the conventional magnitude recurrence relationship proposed by Gutenberg and Richter (1965) and the Stepp (1972) methodology. Figure 22 and Figure 23 show the Stepp recurrence plot and the magnitude recurrence relationship in the conventional form proposed by Gutenberg and Richter (1965) respectively, obtained for the entire area of study.

If a data set is complete, the annual number of earthquakes greater than each magnitude will be the same for a range of time periods (assuming there are no temporal trends in the level of seismicity). Therefore, based on the two methodologies, the data sets shown in Table 6 have been considered as complete for the corrected earthquake catalogue.

Table 6: Completeness Thresholds

Time Period	Magnitude Range
1900 to 2010 for	$M_W \geq 5.5$
1965 to 2010 for	$M_W \geq 5.0$
1978 to 2010 for	$M_W \geq 4.5$
1995 to 2010 for	$M_W \geq 4.0$

Figure 21 shows the events within the suggested completeness thresholds.

5 Seismic Hazard Model

There are two basic methods for assessing the seismic ground motion hazard in a particular region or at a specific site, namely deterministic methods and probabilistic methods. A full description of these methods is given in Reiter (1990). The methodology of probabilistic hazard assessment is described below.

5.1 Methodology

Probabilistic Seismic Hazard Assessment (PSHA) combines seismic source zoning, earthquake recurrence and the ground motion attenuation to produce "hazard curves" in terms of level of ground motion and an associated annual frequency of exceedance. Figure 24 shows the elements used to carry out the PSHA in this study. These elements are as follows:

Seismic Source Zones

Seismic source zones are defined based on the spatial variation of earthquake activity together with geological and tectonic factors. The source zones represent areas where the seismicity is assumed to be homogenous; i.e. there is an equal chance that a given earthquake will occur at any point in the zone. The source zones for this study are presented in Section 5.2.

Recurrence Relationships

A model of earthquake recurrence needs to be developed with respect to earthquake magnitude. There are generally more small (low-magnitude) earthquakes than large (high-magnitude) earthquakes. Observed seismicity is used to determine the earthquake recurrence relationships. The determination of recurrence relationships for this study is described in Section 5.4.

Ground Motion Prediction Equations

Ground-motion prediction equations (GMPEs), or attenuation relationships, predict the level of ground motion at a given location due an earthquake of known magnitude and location. Generally, these are derived from observations from past earthquakes and also provide a measure of the variability of the ground motion parameter. The ground motion equations used in this study are presented in Section 5.7.

The basic methodology adopted is based on that originally proposed by Cornell (1968), modified to include integration over the aleatory variability of the ground motion prediction equations. The probabilistic seismic hazard calculations were carried out using the in-house program Oasys SISMIC.

The analysis presented here calculates the peak ground acceleration (PGA) and the uniform hazard response spectra (UHRS) for given return periods. The UHRS is a multi-parameter description of the ground motion that can be generated from a PSHA, as shown in Figure 24. The UHRS envelopes contributions from a range of earthquakes; For example, the short period motion of a UHRS can be dominated by contributions from small nearby earthquakes while the long period response can be dominated by contributions from large distant earthquakes.

5.2 Seismic Source Model

A seismic source model has been developed based on the seismicity, tectonic and geological data available for Iraq and adjacent areas, as well as existing seismic source models for the Zagros Fold-Thrust Belt. Recent research (i.e., McQuarrie 2004, Engdahl *et al.* 2008) has also been incorporated in order to further improve the definition of the seismicity in terms of depth, style-of faulting and its relation with tectonic elements. The seismic sources used in the hazard model for the Majnoon site are described in greater detail in the following subsections.

5.2.1 Areal Sources

The seismic source model is shown in Figure 25 along with the distribution of seismicity. The deep thrust faults bordering the Zagros Belt are also shown. The seismicity of the region strongly reflects the location of the major tectonic units along the Zagros Belt, namely the Zagros Foredeep, the Simply Folded Belt and the High Zagros, which are oriented roughly in the northwest-southeast direction. The source model attempts to represent these tectonic units in addition to the variations in the observed distribution of seismicity along the strike of the Zagros Belt.

The various source zones are briefly described below:

Source Zone 1: Arabian Shield

Zone 1 represents the stable Arabian plate. This area is considered to be a stable continental region (SCR) as there is very little seismicity recorded within the zone. In the present model, the Arabian Shield is limited by the boundary of the source zone model in the west and south, the Mesopotamian Basin to the east and Kirkuk Embayment to the north.

Source Zone 2: Mesopotamian Basin and Arabian Gulf

Zone 2 encompasses the Mesopotamian Basin and extends to the the Arabian Gulf. The Zone includes the Majnoon site and is characterised by diffuse seismicity. The western boundary follows the Abu Jir lineament.

Source Zone 3: South East Area of Zagros Foredeep

The Zagros Foredeep unit is bounded by the Zagros-Foredeep Fault (ZFF) to the south-west and by the Zagros Mountain Front Fault (MFF) to the north-east. This unit has been further divided into three discrete zones: south-east (Zone 3), central (Zone 4), and north-west (Zone 5), to capture the observed variations in the earthquake activity.

The boundary of Zone 3 to the north is consistent with the location of the Mountain Front Fault (MFF). The southern boundary has been defined with consideration of the distribution of seismicity offshore and the inferred limit of the Zagros Foredeep Fault (ZFF).

Source Zone 4: Central area of Zagros Foredeep (Dezful Embayment)

Zone 4 covers the Central Zagros Foredeep region and is limited by the Mountain Front Fault to the east, and by the Zagros-Foredeep Fault to the west. In contrast to the south-east and north-west Zagros Foredeep, this zone is characterised by a greater number of Magnitude 5-6 events. Relocated seismicity in this zone by

Engdahl *et al.* (2006) indicates that many of the events occur at depths between 20 and 30 km. Zone 4 includes the Dezful Embayment (DE), which appears to be a discrete structural unit with boundaries defined by the Dezful Embayment Fault (DEF) and the Zagros-Foredeep Fault. The seismicity appears to be less intense towards the south-east and closer to the boundary with the ZFF.

Source Zone 5: North West area of Zagros Foredeep (Kirkuk Embayment)

Zone 5 corresponds to the north-west region of the Zagros Foredeep unit, and includes the Kirkuk Embayment and the Mosul-Butmah subzone. Zone 5 represents the reduced level of seismicity observed in this region of the Zagros Foredeep unit, compared to the Central and South East zones.

Source Zone 6: South East area of Simply Folded Belt

The Simply Folded Belt (SFB) unit of Zagros is limited to the northeast by the High Zagros Fault (HZF) and to the southwest by the Mountain Front Fault (MFF). The NW-SE oriented SFB is disrupted locally by nearly N-S trending strike-slip faults, namely: the Kazerun, Borazjan and Dena Faults.

Observed variations in activity and style-of-faulting are captured by dividing the SFB unit into three discrete zones: the south east SFB (Zone 6), the Kazerun and Borazjan Faults (Zone 7) and central-northwest SFB (Zone 8 Zone 6 represents the highly active south-east region of the SFB, which is limited to the west by the source area encompassing the seismicity along the Kazerun and Borazjan Faults.

Source Zone 7: Borazjan, Kazerun and Dena Faults

Zone 7 represents the strike-slip structures taking up some of Arabian-Eurasian deformation. These strike-slip structures include the Borazjan, Kazerun and Dena Faults, which trend across the SFB. The orientation and extent of Zone 7 have been defined with consideration of the mapped fault lineaments presented by Berberian (1995) and IIEES (2003), and the location of strike-slip focal mechanism events reported in the CMT Harvard catalogue.

Source Zone 8: Central and North-West area of Simply Folded Belt

Zone 8 represents the central and north-west region of the Simply Folded Belt (SFB). The central-northwest (Source 8) and the south-east region (Source 6) of the SFB are separated by the Borazjan, Kazerun and Dena Faults. Earthquake activity in Zone 8 is lower than in Zone 6.

Source Zone 9: North-West area of High Zagros

The High Zagros unit (is limited to the north-east by the Main Zagros Reverse Fault (MZRF) and the Zagros Recent Fault (ZRF) and to the south-west by the High Zagros Fault (HZF). This unit has been divided into two discrete zones: north-west (Zone 9) and southeast (Zone 10).The largest event in the catalogue is the 1909 7.4Mw in Zone 9.

Source Zone 10: South-East area of High Zagros

Zone 10 represents the south-east region of the High Zagros unit, which appears to be less active than the north-west region. Figure 25 shows that Zone 10 is less active than Zone 9. The maximum observed magnitude this zone is 6.6Mw.

Source Zone 11: Central Iranian Basin

The Central Iranian Basin has a moderate level of seismic activity.

5.2.2 Fault Sources: The Zagros Foredeep Fault

The Zagros Foredeep Fault (ZFF) defines the south-west limit of the Zagros Foredeep unit. The ZFF is a segmented reverse-slip system which has a surface expression to the southwest of the Dezful Embayment.

The ZFF reportedly ruptured in a magnitude 6.5 event in 840 AD (Berberian, 1995). The events in 1130 of magnitude 6.8, (Ambraseys & Melville, 1982) and in 1864 of magnitude 6.4 (Ambraseys & Jackson, 1998) could also be associated with the northwest end of the ZFF.

In the areal source model (Section 5.2.1), the activity associated with the ZFF is included in Zone 4, which also encompasses the earthquake activity observed within the Central Zagros Foredeep region (including the Dezful Embayment). However, most of the M<6.0 events in the Dezful Embayment occurred relatively far from the ZFF.

In order to capture the epistemic uncertainty in the model for Zone 4 and the ZFF, two source models are considered:

- Source Model 1 - the seismicity in the Dezful Embayment and the ZFF is modelled by an area source (Zone 4), and
- Source Model 2 - only $4 \leq M_W \leq 6.25$ are allowed to occur in Zone 4 and $6.25 \leq M_W \leq 7.25$ events are assumed to occur along the ZFF.

There is limited information available to characterise the ZFF for hazard modelling purposes. Therefore, a number of assumptions have been made with regard to its geometry, maximum magnitude and activity. The location and length of this fault has been taken from Berberian (1995), Berberian & Yeats (1999) and the map of active faults of Iran by IIESS (2003). The map of active faults of Iran produced by IIESS (2003) indicates that the ZFF may extend from 34°N, 46°E to 27°N, 56°E, although towards the ends, only the inferred location is reported. Since the segment that is most likely to affect the hazard at the Majnoon site is that running parallel to the western boundary of Source Zone 4, the line source modelled only extends along this boundary.

Along the modelled segment of about 720 km, the maximum rupture size has been set so the maximum credible earthquake magnitude equals $7.25M^W$, based on Wells & Coppersmith (2004). A characteristic earthquake recurrence model has been used for the ZFF (Youngs & Coppersmith, 1985).

The alternative source model is presented in Figure 26.

5.3 Comparison with existing source models

In this sectionthe source model developed in thisstudy is compared with source models for the region derived in previous studies.

Figure 4 shows the seismic source model for Iran used in the GSHAP regional study by Tavakoli & Ghaforty-Ashtiany (1999). Comparison of the model for this study and the Tavakoli & Ghaforty-Ashtiany (1999) model shows that while both take into consideration the various tectonic units of the Zagros Belt, the Arup

source model divides the various units into more discrete zones, hence providing a greater level of detail. This subdivision is more consistent with the spatial pattern of seismicity along the strike of the Zagros belt, based on the compiled catalogue. Furthermore, when evidence of zones with a preferred style-of-faulting was found, this was incorporated in our source model.

The Tavakoli & Ghaforty-Ashtiany (1999) model may not be adequate to estimate the level of hazard at the Majnoon site, given the assumption of homogeneous seismicity in Zone 13, which accounts for the activity in the Zagros Foredeep. It is clear that earthquake activity in the north-west part of Zone 13 is less active than that observed in the south-east region. Since the Tavakoli & Ghaforty-Ashtiany (1999) model was developed for Iran, source zones to account for the seismicity in the Mesopotamian Basin, Persian Gulf and Arabian Shield are not considered which again poses a limitation when applying this model to the Iraq region.

Figure 7 shows the source model developed by Ameer *et al.* (2005) for the Iraq region. The authors indicate that the model was based on both neo-tectonic elements and variations in the homogeneity of the seismicity; however, Figure 7 suggests that the delineation of the various source zones follows the distribution of seismicity rather than the location of tectonic units. Furthermore, the various zones are shown to overlap and it is not clear how the seismicity is divided in these zones.

Overall, the Arup model represents both the distribution of seismicity and location of main tectonic features. Larger zones have been divided into more discrete zones where appropriate in order to capture variations in seismic activity.

5.4 Earthquake Recurrence Parameters

The rate of occurrence of earthquakes in each area zone is described in terms of magnitude recurrence relationships in the form of the 'Gutenberg-Richter' relationship:

$$log_{10}N = a - bM \qquad \text{Equation 6}$$

where N = the annual number of earthquakes greater than magnitude M;

a = the activity rate, defined as the annual number of earthquakes greater than magnitude 4.0; and,

b = the slope of the recurrence relationship

Before the application of Equation 6, the completeness of the data within each zone needs to be assessed, following the Stepp (1972) or magnitude recurrence plot procedure (see Section 4.6). The complete part of the catalogue together with Equation 6 are used to calculate a and b values for each source zone through application of Weichert's maximum likelihood approach (Weichert 1980). Table 7 shows the values for a and b and, the associated variability (σ) for each seismic source zone using the magnitude recurrence data shown in Figure 27 and Figure 28.

Table 7: Recurrence Parameters and Maximum Magnitudes

No Source Zone		Area [km2]	b-value calculated		b-value assumed		Activity Rate [N>4/yr]		Maximum Magnitude	
No.	Name		mean	σ	mean	σ	mean	σ	Observed	Assigned (mean ± σ)
1	Arabian Shield	571,183	1.60	0.308	1.15	0.125	0.738	0.191	5.10	7.00 ±0.2
2	Mesopotamian Basin and Arabian Gulf	250,135	1.29	0.096	1.15	0.150	3.726	0.407	6.10	7.00 ±0.2
3	SE Zagros Foredeep	17,857	1.11	0.073	1.10	0.100	3.871	0.395	6.80	7.20 ±0.2
4	Central Zagros Foredeep (Dezful Embayment)	63,273	1.08	0.036	1.08	0.100	14.710	0.764	6.80	7.20 ±0.2
5	NW Zagros Foredeep (Kirkuk Embayment)	33,089	1.13	0.195	1.14	0.100	0.617	0.159	6.40	7.00 ±0.2
6	SE Simply Folded Belt	73,219	1.13	0.036	1.14	0.100	17.188	0.840	7.10	7.50 ±0.2
7	Borazjan, Kazerun and Den Strike-Slip Faults	12,507	1.10	0.069	1.11	0.100	4.461	0.423	6.30	7.00 ±0.2
8	NW Simply Folded Belt	93,379	1.09	0.041	1.09	0.100	11.967	0.691	6.80	7.20 ±0.2
9	NW High Zagros	64,592	1.04	0.052	1.05	0.100	6.203	0.489	7.40	7.80 ±0.2
10	SE High Zagros	39,933	1.03	0.138	1.05	0.100	0.963	0.193	6.60	7.00 ±0.2
11	Central Iranian Basin	240,114	1.18	0.098	1.14	0.100	2.653	0.334	6.90	7.30 ±0.2

5.5 Minimum and Maximum Magnitudes

A minimum magnitude of 5.0M_W has been adopted for the seismic hazard assessment, because the likelihood of an earthquake of smaller magnitude causing damage to engineered structures can be discounted, and using a lower minimum magnitude can potentially increase the high-frequency (very short-period) ground motions.

The maximum magnitude that has been assigned to each zone for the hazard calculations has been chosen with consideration of the tectonic regime and is generally limited by the existing earthquake records. For most zones this value was determined by rounding the largest recorded magnitude upwards, subject to a minimum value of 7.0. The maximum recorded magnitudes and those assumed for the hazard calculations are given in Table 7. Additionally, the epistemic

uncertainty is explicitly considered through a logic tree approach by considering ±1σ (standard deviation) for M_{max}, as described in a later section.

5.6 Focal Depth Distributions

The depth distributions in each source zone have been used to define depth distribution curves (Table 8). These are used in the PSHA to allow for the uncertainty in the depth distribution input. For the purpose of estimating depth distribution curves, events associated with unreported focal depths (i.e. 0 km) or catalogue default depths (i.e. 10 or 33 km) have not been included.

Table 8: Focal Depth Distributions

Depth Distribution	**Depth in km (Weight in %)**										**Source Areas**
1	2.5 (5.0)	7.5 (15.0)	12.5 (25.0)	17.5 (25.0)	22.5 (15.0)	27.5 (10.0)	32.5 (5.0)				1,2,10, 11
2	2.5 (5.0)	7.5 (10.0)	12.5 (17.5)	17.5 (17.5)	22.5 (10.0)	27.5 (7.5)	32.5 (10.0)	37.5 (10.0)	42.5 (7.5)	47.5 (5.0)	3,4,5,6, 7,8,9

5.7 Ground Motion Models

Ground-motion predictive equations, commonly referred to as attenuation relationships, appropriate for the tectonic environments present in the region under study have been selected (Table 9). To account for the epistemic uncertainty, several ground-motion predictive equations have been selected for each tectonic regime, as shown in Table 10.

Table 9: Selected Ground Motion Attenuation Equations for Majnoon PSHA

Attenuation Equation	**Tectonic Region**	**Region**	**C**	**M**	**R**	**Focal Mech**	**Site Class**	**Max T (s)**
Boore and Atkinson (2007)	Shallow crustal earthquakes	Worldwide (California)	G_{Mro}	M_W	R_{jb}	3	$V_{s,30}$	10.0
Campbell & Bozorgnia (2007)	Shallow crustal earthquakes	Worldwide (California)	G_{Mro}	M_W	R_{rup}; R_{jb}	3	$V_{s,30}$	10.0
Atkinson & Boore (2006)	Stable continental	Eastern North America	R_m	M_W	R_{rup}	-	$V_{s,30}$	5.0
Akkar & Bommer (2007)	Shallow crustal	Europe & Middle East	G	M_W	R_{jb}	3	Rock, Stiff Soil, Soft Soil	3.0

Definitions:

C – Use of the horizontal components of each record

a. G: geometric mean;
b. G_{Mro}: rotated geometric mean as proposed by Boore *et al.* (2006); and,
c. R_m: Random component.

M – Magnitude scaled used

a. M_W, moment magnitude.

R – Source-to-site distance (see Ambrahmson & Shedlock, 1997)

a. R_{jb}: closest horizontal distance to the surface projection of the fault plane; and,

Attenuation Equation	Tectonic Region	Region	C	M	R	Focal Mech	Site Class	Max T (s)
b. R_{rup}: closest distance to rupture surface. Focal Mechanism – Type of focal mechanisms a. 3: includes normal, strike-slip and reverse styles of faulting Site Class – site classification used b. $V_{s,30}$: average shear wave velocity in the uppermost 30m of the soil profile. Max T (s) – Maximum response period in seconds for which a GMPE is formulated								

According to Engdahl *et al.* (2006),most of the earthquakes in the continental lithosphere of the Iran-Iraq region occur in the upper crust with crustal shortening produced by the continental collision. Therefore, ground motion models for shallow crustal environments in active tectonic regions have been selected to model the distribution of ground motions in the Zagros Fold-Thrust Belt.

Focal mechanisms of earthquakes along the main Zagros Master Faults are consistent with reverse faulting occurring on relatively steep fault planes, although there is also some strike-slip mechanism events associated with strike-slip structures taking some of the deformation in the region (Berberian, 1995). The influence of style-of-faulting on ground-motion amplitudes for shallow-crustal events is widely acknowledged (e.g., Bommer *et al.* 2003), with reverse events producing larger ground motions than strike-slip and normal events. Therefore shallow-crustal equations that account for the effect of style-of faulting are considered in this study. It is noted however that for zones where details on the controlling fault mechanism are unknown, it is assumed that all styles of faulting are possible. This is recorded for each zone in Table 10.

As described in Section 2.2.3, the deep sedimentary basin of the Mesopotamian Basin can be expected to amplify earthquake ground motions. In order to model this effect, the shallow crustal model of Campbell & Bozorgnia (2007) that accounts for deep basin effects has been included.

For the stable Arabian Shield (Zone 1), equations for stable continental regions have been selected. The Central Iranian Basin (Zone 11) has been considered as a mixed zone but the ground motions have been modelled by the Atkinson & Boore (2006) equation for stable continental regions and the Boore & Atkinson (2007) model for shallow-crustal regimes.

Table 10: Selected Ground Motion Attenuation Equations

Source Zone No.	Source Zone Name	Tectonic Regime and Style-of-Faulting	Ground-Motion Model
1	Arabian Shield	Stable Continental	Atkinson & Boore (2006)
2	Mesopotamian Basin and Arabian Gulf	Mixed (Crustal - All mechanisms/Stable Continental)	Atkinson & Boore (2006); Campbell & Bozorgnia (2007)
3	SE Zagros Foredeep	Shallow Crustal (Reverse Faulting)	Akkar & Bommer (2007); Boore & Atkinson (2007), Campbell & Bozorgnia (2007)
4	Central Zagros Foredeep (Dezful Embayment)	Shallow Crustal (Reverse Faulting)	Akkar & Bommer (2007)); Boore & Atkinson (2007), Campbell & Bozorgnia (2007)
5	NW Zagros Foredeep	Mixed (Crustal - All mechanisms/Stable	Atkinson & Boore (2006)); Boore &

Source Zone No.	Source Zone Name	Tectonic Regime and Style-of-Faulting	Ground-Motion Model
	(Kirkuk Embayment)	Continental)	Atkinson (2007)
6	SE Simply Folded Belt	Shallow Crustal (Reverse Faulting)	Akkar & Bommer (2007)); Boore & Atkinson (2007), Campbell & Bozorgnia (2007)
7	Borazjan, Kazerun and Dena Strike-Slip Faults	Shallow Crustal (Strike-slip Faulting)	Akkar & Bommer (2007)); Boore & Atkinson (2007), Campbell & Bozorgnia (2007)
8	NW Simply Folded Belt	Shallow Crustal (Reverse Faulting)	Akkar & Bommer (2007)); Boore & Atkinson (2007), Campbell & Bozorgnia (2007)
9	NW High Zagros	Shallow Crustal (Reverse Faulting)	Akkar & Bommer (2007)); Boore & Atkinson (2007), Campbell & Bozorgnia (2007)
10	SE High Zagros	Shallow Crustal (Reverse Faulting)	Akkar & Bommer (2007)); Boore & Atkinson (2007), Campbell & Bozorgnia (2007)
11	Central Iranian Basin	Mixed (Crustal - All mechanisms/Stable Continental)	Atkinson & Boore (2006)); Boore & Atkinson (2007)

5.8 Logic Tree

Figure 29 shows the logic tree developed for this study. This shows the various values and weights given to parameters to capture the influence of epistemic uncertainty. These are discussed below.

b-values

Allowance for variation in the b-value in all zones has been incorporated in the seismic model by assigning weights of 60%, 20% and 20% to the mean and mean ± 1 standard deviation of b-value respectively, as given in Table 7, broadly following a normal distribution suggested by Keefer and Bodily (1982).

Activity Rate

For modelling simplicity, all zones have been assigned activity rates equal to the mean value given in Table 7.

Maximum Magnitude

Allowance has been made for variability of maximum magnitude in the different zones by attributing weights of 60%, 20% and 20% to the mean and mean ± 1 standard deviation, σ, of M_{max} given in Table 7.

Ground Motion Attenuation Equations

Uncertainty in the ground motion prediction equations is included directly in the analysis. The distribution in the uncertainty in the ground motion prediction is assumed to be log-normally distributed and has been truncated at 5 standard deviations from the median predictions.

Ground Motion Models

The shallow-crustal model of Akkar & Bommer (2007), which includes data from the Euro-Mediterranean region, has been assigned a weight of 34% and weights of 33% have been assigned to the two other shallow crustal models.

Since the Boore & Atkinson (2007) model has been shown to be highly applicable to the Euro-Mediterranean region (Stafford *et al.*, 2007), a weight of 50% has been assigned to this model in the mixed zones. A 50% weight has also been assigned to the Atkinson & Boore (2006) models.

6 Seismic Hazard Assessment Results

The results of the probabilistic seismic hazard assessment are presented in the form of the PGA values and uniform hazard response spectra (UHRS) for the Majnoon site. The co-ordinates for the Majnoon site are shown in Table 11:

Table 11: Location of Hazard Assessment

Facility Reference	**Co-ordinates (˚)**	
	Latitude	Longitude
Majnoon Site	31.075	47.619

The seismic hazard has been assessed for multiple soil conditions, return periods and damping levels. The UHRS are presented for response periods up to 3 seconds, due to the constraints of the ground motion model used (Section 5.7). However, standard methods are used to extend the response spectra to long periods. Vertical hazard response spectra have been estimated based on the computed horizontal UHRS and the methodology developed by Bozorgnia & Campbell (2004). De-aggregation results are presented at multiple spectral periods to illustrate the characteristic earthquakes for the site.

6.1 Ground Conditions

The seismic hazard assessment has been carried out for multiple ground conditions with varying shear wave velocity ($V_{s,30}$) profiles. The selected $V_{s,30}$ profiles are consistent with the site classification boundaries presented in the International Building Code (IBC, 2009): $V_{s,30}$ = 180 and 760m/s; corresponding to soft soil profile and rock (site class E and B respectively). The NGA equations, presented in Section 5.7, selected for this analysis explicitly consider the $V_{s,30}$ values. Akkar and Bommer (2007) equations also correspond with the same two profiles, idealised as: soft soil profile and rock.

6.2 Uniform Hazard Spectra

Hazard values have been computed for return periods of 475 and 2,475 years; corresponding to 10 percent and 2 percent probabilities of exceedance in 50 years. The UHRS for each return period and type of soil profile is shown in the following table and illustrated in Figure 30:

Table 12: PSHA generated Uniform Hazard Response Spectrum

Period (s)	**475year Return Period**		**2,475year Return Period**	
	Soft Soil ($V_{s,30}$ = 180m/s)	**Rock ($V_{s,30}$ = 760m/s)**	**Soft Soil ($V_{s,30}$ = 180m/s)**	**Rock ($V_{s,30}$ = 760m/s)**
0.00	1.30	0.79	2.50	1.65
0.05	1.77	1.17	3.36	2.77
0.10	2.24	1.64	4.02	3.71
0.20	2.78	1.88	4.74	3.80
0.40	2.73	1.34	4.59	2.45
0.50	2.53	1.10	4.28	1.97

Period (s)	475year Return Period		2,475year Return Period	
	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)
1.00	1.63	0.57	2.80	0.99
2.00	0.69	0.21	1.25	0.38
4.00	0.29	0.12	0.52	0.20

6.2.1 Confidence levels at spectral ordinates

Plots of expected PGA, 0.2-second period and 1.0-second period spectral ordinates against return period for varying confidence intervals are provided for the Majnoon site in Figure 31.

6.2.2 Effect of Attenuation equations

Plots of the expected PGA, 0.2-second period and 1.0-second period spectral ordinates against return period from each ground motion prediction equation to indicate their relative contribution to the overall hazard are provided for the Majnoon site in Figure 32. The attenuation equations defined for Zone 2: Mesopotamian Basin and Arabian Gulf: Campbell and Bozorgnia (2007), which accounts for basin effects (Section 2.2.3), and stable continental region model, control the hazard for the Majnoon site at short periods. However, for the longer response periods, Akkar and Bommer (2007) and Boore and Atkinson (2007) influence the hazard. This is examined further in the hazard deaggregation section (Section 6.3).

6.2.3 Source Model Contribution

Plots of PGA, and hazard values at 0.2 second period and 1.0 second period against return period from each area source zone are provided in Figure 33. As would be expected, at lower return periods Zone 2 (Mesopotamian Basin and Arabian Gulf) controls the hazard. However, at higher return periods, Zone 4 (Central Zagros Foredeep) increasingly contributes to the hazard as distant earthquakes become more influential.

6.2.4 Comparison with other studies

A comparison of these results with other studies reviewed in Section 3 is presented in Figure 34. The results from the present study are generally lower than those presented for GSHAP. This can be explained by the fact that the GSHAP values were explained by spreading the activity in the Zagros region to Majnoon site. As the UFC uses the same GSHAP base data for inferring Ss and S1 parameters, it is also affected by similar uncertainties. Lastly, ISO values are found to be more closely matched with those estimated presenting this study.

6.3 De-aggregation of the Results

De-aggregation of the probabilistic seismic hazard values provides f plots of the relative contributions to the overall hazard at the sites made by different magnitude earthquakes at varying distances from the site. Plots of the de-aggregated hazard at PGA, 0.2-second period and 1.0-second period are provided

for the Majnoon site at 475 and 2,475 year return periods from Figure 35 to Figure 37.

These plots show the short period hazard at Majnoon site is controlled by $5.25 \leq M_W \leq 6.25$ events at distances of between 20 and 50km. However, at 1.0 sec and for 475 year return period, the hazard at Majnoon site is controlled by $M_W >$ 6.50 at distances over 100km.

This illustrates the purpose of carrying out a site specific PSHA and deriving a UHRS which encapsulates earthquakes that contribute to the hazard at a particular site at different response periods. A simple method of scaling the response spectrum by PGA, as advised by many codes, would therefore not be able to take this into account explicitly.

6.4 Long Period Spectra Extension

Due to the characteristics of some structures, whose fundamental period lie outside the range of periods covered by the predictive equations used in the hazard analysis, the Uniform Hazard Response Spectra (UHRS) needs to be extended to longer periods.

Extrapolation of design spectra (expressed here in terms of pseudo-spectral response acceleration, PSA) to longer periods is usually done by assuming constant spectral velocity from the longest period of the original spectrum (T1) to a corner period (T2), and to assume constant spectral displacement beyond T2, using the following equations:

$$PSA = \frac{T_1}{T} PSA(T_1) \qquad T_1 \leq T \leq T_2 \qquad \text{Equation 7}$$

$$PSA = \left(\frac{T_2}{T}\right)^2 PSA(T_2) \qquad T > T_2 \qquad \text{Equation 8}$$

In the present study, the guidance provided in FEMA 450 is followed, which recommends the corner period T2 to be calculated as a function of the earthquake magnitude, using the following expression:

$$Log(T_2) = -1.25 + 0.3M \qquad \text{Equation 9}$$

The earthquake magnitude used to estimate the corner period has been obtained from the de-aggregation of the hazard. According to the de-aggregation results, the earthquake events that most contribute to the hazard in the long period range (>1.0 sec) are events with magnitude $6.75 \leq M_W \leq 7.25$. Therefore, based on a characteristic earthquake of $M_W = 7.0$, the corner period may be estimated to be about 7 sec. The 475 and 2475 year response spectra for the Majnoon site extrapolated to 10 seconds using this method are shown in Figure 38 and the corresponding values are listed in Table 13.

Table 13: Horizontal Response Spectra – 5% Damping

Period (s)	**475year Return Period**		**2,475year Return Period**	
	Soft Soil ($V_{s,30}$ = 180m/s)	**Rock ($V_{s,30}$ = 760m/s)**	**Soft Soil ($V_{s,30}$ = 180m/s)**	**Rock ($V_{s,30}$ = 760m/s)**
0.00	1.30	0.79	2.50	1.65

Period (s)	475year Return Period		2,475year Return Period	
	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)
0.05	1.77	1.17	3.36	2.77
0.10	2.24	1.64	4.02	3.71
0.20	2.78	1.88	4.74	3.80
0.40	2.73	1.34	4.59	2.45
0.50	2.53	1.10	4.28	1.97
1.00	1.63	0.57	2.80	0.99
2.00	0.69	0.21	1.25	0.38
4.00	0.29	0.12	0.52	0.20
5.00*	0.23	0.10	0.41	0.16
6.00*	0.19	0.08	0.34	0.14
7.00*	0.16	0.07	0.29	0.12
8.00*	0.13	0.05	0.23	0.09
9.00*	0.10	0.04	0.18	0.07
10.00*	0.08	0.03	0.14	0.06
** Periods for which the uniform hazard response spectrum has been extended, based on Section 6.4*				

6.5 Vertical Response Spectra

Vertical Uniform Hazard Response Spectra were not derived directly from the probabilistic seismic hazard assessment due to the lack of appropriate ground motion equations.

Several studies have investigated the characteristics of vertical ground motions (e.g. Bozorgnia *et al.*, 1996, Bozorgnia & Campbell, 2004), indicating that the ratio of vertical-to-horizontal ground motions (V/H) is a function of the spectral period, the source-to-site distance and the local site conditions and a relatively weaker function of the earthquake magnitude and focal mechanism. The V/H ratios only show significant distance dependence at periods of less than about 0.1 seconds. The behaviour of the V/H ratios with distance also depends on the local site conditions.

Bozorgnia & Campbell (2004) found that the V/H ratios higher at short periods than longer periods.

Bozorgnia & Campbell (2004) provide predictive equations for V/H ratios of response spectra for shallow-crustal environments in active tectonic regions, valid for earthquakes of magnitudes $M_W \geq 5.0$ and distance of less than 60km from the source. Their V/H response spectral ratio equation is considered to be a reasonable estimate and thus used as a proxy for the estimation of the vertical design spectra.

From the hazard de-aggregation results shown in Section 6.3, it can be observed that the events that most contribute to the hazard in the short period range ($T \leq 0.2$ sec, which is the period range of relevance to vertical ground motions), are events of magnitude $5.25 \leq M_W \leq 6.25$ at distances less than 45 km from the site. These

magnitude-distance scenarios are then used to estimate of V/H ratios to enable to computation of vertical response spectra. Figure 39 shows the V/H ratios for generic rock and generic soil estimated for characteristic earthquakes magnitudes of M_W=5.75 at 19 km from the Majnoon site, using the Bozorgnia & Campbell (2004) relations. These figures indicate that the V/H ratios at distances of 19 km and periods less than 0.10 seconds exceed the 0.5 value usually recommended by codes, although at longer distances the code recommendations come closer to the V/H ratios obtained for these earthquake scenarios. To enable the computation of the vertical spectra, the V/H ratios at distances at 19 km averaged with respect to magnitude are used, following a conservative approach. The resulting vertical spectra at generic rock and generic soil sites for the two return periods considered are presented in Figure 40 for Majnoon site. The results are also presented for each ground profile and return period in Table 14.

Table 14: Vertical Response Spectra – 5% Damping

Period (s)	**475year Return Period**		**2,475year Return Period**	
	Soft Soil ($V_{s,30}$ = 180m/s)	**Rock ($V_{s,30}$ = 760m/s)**	**Soft Soil ($V_{s,30}$ = 180m/s)**	**Rock ($V_{s,30}$ = 760m/s)**
0.00	0.86	0.53	1.65	1.10
0.05	1.26	0.82	2.38	1.94
0.10	1.70	1.19	3.05	2.69
0.20	1.38	0.98	2.35	1.98
0.40	1.06	0.65	1.79	1.20
0.50	0.92	0.53	1.55	0.95
1.00	0.63	0.28	1.08	0.49
2.00	0.31	0.12	0.57	0.22
4.00	0.16	0.07	0.28	0.13
5.00	0.13	0.06	0.22	0.10
6.00	0.10	0.05	0.19	0.08
7.00	0.09	0.04	0.16	0.07
8.00	0.07	0.03	0.12	0.06
9.00	0.05	0.03	0.10	0.04
10.00	0.04	0.02	0.08	0.04

6.6 Damping Adjusted Response Spectra

There is a growing requirement for response spectra to be developed at damping levels other than the standard 5%. This is partly due to the increased use of energy dissipating devices (dampers) and seismic isolation systems. It has been requested by Shell that the horizontal and vertical response spectra are presented 0.5, 2, 5, 7, 10 and 20 percent damping levels.

Newmark and Hall (1982) were responsible for developing the basis for adjusting 5% damped spectra to other levels of damping. Although, the spectrum amplification factors of Newmark and Hall were based on only 28 accelerograms, subsequent research with significantly more acceleration time-histories (Naeim and Kircher, 2001), has shown the original damping adjustment factors to be

approximately valid. For the purposes of this study, the adjustment factors by FEMA 440 have been adopted, which may be derived from the following equation:

$$B = \frac{4}{5.6 - \ln(100\beta)} \qquad \text{Equation 10}$$

where, β is the effective damping

B is the damping adjustment factor

The horizontal and vertical response spectra at different damping levels are presented in Table 15 to Table 19 and illustrated in Figure 41 and Figure 42.

Table 15: 0.5% Damped Response Spectra

Period (s)	475year Return Period				2,475year Return Period			
	Horizontal Response Spectrum		Vertical Response Spectrum		Horizontal Response Spectrum		Vertical Response Spectrum	
	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)
0.00	2.04	1.24	1.35	0.83	3.93	2.59	2.60	1.74
0.05	2.79	1.84	1.98	1.29	5.28	4.35	3.75	3.05
0.10	3.53	2.58	2.68	1.88	6.33	5.83	4.81	4.24
0.20	4.37	2.95	2.17	1.54	7.46	5.98	3.70	3.12
0.40	4.29	2.10	1.67	1.03	7.22	3.85	2.82	1.89
0.50	3.98	1.73	1.44	0.84	6.74	3.09	2.45	1.50
1.00	2.56	0.89	0.99	0.44	4.40	1.56	1.70	0.77
2.00	1.08	0.34	0.49	0.19	1.96	0.60	0.89	0.34
4.00	0.45	0.19	0.25	0.12	0.81	0.32	0.44	0.20
5.00	0.36	0.15	0.20	0.09	0.65	0.26	0.35	0.16
6.00	0.30	0.12	0.16	0.08	0.54	0.21	0.29	0.13
7.00	0.26	0.11	0.14	0.07	0.46	0.18	0.25	0.11
8.00	0.20	0.08	0.11	0.05	0.36	0.14	0.19	0.09
9.00	0.16	0.06	0.09	0.04	0.28	0.11	0.15	0.07
10.00	0.13	0.05	0.07	0.03	0.23	0.09	0.12	0.06

Table 16: 2.0% Damped Response Spectra

Period (s)	475year Return Period				2,475year Return Period			
	Horizontal Response Spectrum		Vertical Response Spectrum		Horizontal Response Spectrum		Vertical Response Spectrum	
	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)
0.00	1.59	0.97	1.05	0.65	3.06	2.02	2.02	1.35
0.05	2.18	1.44	1.54	1.01	4.12	3.39	2.92	2.38
0.10	2.75	2.01	2.09	1.46	4.94	4.55	3.75	3.30

Period (s)	475year Return Period				2,475year Return Period			
	Horizontal Response Spectrum		Vertical Response Spectrum		Horizontal Response Spectrum		Vertical Response Spectrum	
	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)
0.20	3.40	2.30	1.69	1.20	5.81	4.66	2.89	2.43
0.40	3.35	1.64	1.31	0.80	5.63	3.00	2.20	1.47
0.50	3.10	1.35	1.13	0.65	5.25	2.41	1.91	1.17
1.00	2.00	0.69	0.77	0.34	3.43	1.22	1.33	0.60
2.00	0.84	0.26	0.38	0.15	1.53	0.47	0.70	0.27
4.00	0.35	0.15	0.19	0.09	0.63	0.25	0.34	0.16
5.00	0.28	0.12	0.15	0.07	0.51	0.20	0.27	0.12
6.00	0.24	0.10	0.13	0.06	0.42	0.17	0.23	0.10
7.00	0.20	0.08	0.11	0.05	0.36	0.14	0.20	0.09
8.00	0.15	0.06	0.08	0.04	0.28	0.11	0.15	0.07
9.00	0.12	0.05	0.07	0.03	0.22	0.09	0.12	0.05
10.00	0.10	0.04	0.05	0.03	0.18	0.07	0.10	0.04

Table 17: 7% Damped Response Spectra

Period (s)	475year Return Period				2,475year Return Period			
	Horizontal Response Spectrum		Vertical Response Spectrum		Horizontal Response Spectrum		Vertical Response Spectrum	
	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)
0.00	1.19	0.72	0.78	0.48	2.28	1.51	1.51	1.01
0.05	1.62	1.07	1.15	0.75	3.07	2.53	2.18	1.77
0.10	2.05	1.50	1.56	1.09	3.68	3.39	2.79	2.46
0.20	2.54	1.71	1.26	0.89	4.33	3.47	2.15	1.81
0.40	2.49	1.22	0.97	0.60	4.19	2.24	1.64	1.10
0.50	2.31	1.00	0.84	0.49	3.91	1.80	1.42	0.87
1.00	1.49	0.52	0.57	0.26	2.55	0.91	0.99	0.45
2.00	0.63	0.20	0.28	0.11	1.14	0.35	0.52	0.20
4.00	0.26	0.11	0.14	0.07	0.47	0.19	0.26	0.12
5.00	0.21	0.09	0.11	0.05	0.38	0.15	0.20	0.09
6.00	0.18	0.07	0.10	0.05	0.31	0.12	0.17	0.08
7.00	0.15	0.06	0.08	0.04	0.27	0.11	0.15	0.07
8.00	0.12	0.05	0.06	0.03	0.21	0.08	0.11	0.05
9.00	0.09	0.04	0.05	0.02	0.16	0.06	0.09	0.04
10.00	0.07	0.03	0.04	0.02	0.13	0.05	0.07	0.03

Table 18: 10% Damped Response Spectra

Period (s)	475year Return Period				2,475year Return Period			
	Horizontal Response Spectrum		Vertical Response Spectrum		Horizontal Response Spectrum		Vertical Response Spectrum	
	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)
0.00	1.07	0.65	0.71	0.44	2.06	1.36	1.36	0.91
0.05	1.46	0.97	1.04	0.68	2.77	2.28	1.96	1.60
0.10	1.85	1.35	1.40	0.98	3.32	3.06	2.52	2.22
0.20	2.29	1.55	1.14	0.81	3.91	3.13	1.94	1.63
0.40	2.25	1.10	0.88	0.54	3.78	2.02	1.48	0.99
0.50	2.09	0.90	0.76	0.44	3.53	1.62	1.28	0.78
1.00	1.34	0.47	0.52	0.23	2.31	0.82	0.89	0.40
2.00	0.57	0.18	0.26	0.10	1.03	0.32	0.47	0.18
4.00	0.24	0.10	0.13	0.06	0.43	0.17	0.23	0.10
5.00	0.19	0.08	0.10	0.05	0.34	0.13	0.18	0.08
6.00	0.16	0.07	0.09	0.04	0.28	0.11	0.15	0.07
7.00	0.14	0.06	0.07	0.03	0.24	0.10	0.13	0.06
8.00	0.10	0.04	0.06	0.03	0.19	0.07	0.10	0.05
9.00	0.08	0.03	0.04	0.02	0.15	0.06	0.08	0.04
10.00	0.07	0.03	0.04	0.02	0.12	0.05	0.06	0.03

Table 19: 20% Damped Response Spectra

Period (s)	475year Return Period				2,475year Return Period			
	Horizontal Response Spectrum		Vertical Response Spectrum		Horizontal Response Spectrum		Vertical Response Spectrum	
	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)
0.00	0.85	0.51	0.56	0.34	1.63	1.07	1.07	0.72
0.05	1.15	0.76	0.82	0.53	2.19	1.80	1.55	1.26
0.10	1.46	1.07	1.11	0.78	2.62	2.41	1.99	1.75
0.20	1.81	1.22	0.90	0.64	3.09	2.47	1.53	1.29
0.40	1.78	0.87	0.69	0.43	2.99	1.59	1.17	0.78
0.50	1.65	0.71	0.60	0.35	2.79	1.28	1.01	0.62
1.00	1.06	0.37	0.41	0.18	1.82	0.65	0.70	0.32
2.00	0.45	0.14	0.20	0.08	0.81	0.25	0.37	0.14
4.00	0.19	0.08	0.10	0.05	0.34	0.13	0.18	0.08
5.00	0.15	0.06	0.08	0.04	0.27	0.11	0.15	0.07
6.00	0.13	0.05	0.07	0.03	0.22	0.09	0.12	0.06
7.00	0.11	0.04	0.06	0.03	0.19	0.08	0.10	0.05
8.00	0.08	0.03	0.04	0.02	0.15	0.06	0.08	0.04

Period (s)	475year Return Period				2,475year Return Period			
	Horizontal Response Spectrum		Vertical Response Spectrum		Horizontal Response Spectrum		Vertical Response Spectrum	
	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)	Soft Soil ($V_{s,30}$ = 180m/s)	Rock ($V_{s,30}$ = 760m/s)
9.00	0.06	0.03	0.04	0.02	0.12	0.05	0.06	0.03
10.00	0.05	0.02	0.03	0.01	0.09	0.04	0.05	0.02

6.7 Hazard Variation across Majnoon

A brief sensitivity study has been carried out to investigate how the hazard varies across the entire length of Majnoon site. Therefore, in addition to the main seismic hazard evaluation point (as located in Section 6), hazard was also evaluated at a northern and southern point, as shown in Figure 43. The results are shown in the Table 20. The results show that there is an increase in hazard in the northern area of Majnoon.

Table 20: Hazard variation across Majnoon

Reference	Latitude °	Longitude °	475year RP PGA (m/s^2)
Main Seismic Hazard Evaluation Point	31.075	47.619	0.8
Northern Seismic Hazard Evaluation Point	31.39	47.65	0.9
Southern Seismic Hazard Evaluation Point	30.94	47.63	0.8

6.8 Code compatible spectra

It has been requested by Shell that an equivalent Uniform Building Code (UBC) defined spectrum is presented which is compatible with Arup's PSHA defined UHRS for 475-yr return period and soil class D/E at 5% damping. The UBC defined spectrum will form the basis for contractor's structural analysis in STAAD.PRO software. The UBC compatible spectrum is presented in Figure 44 (converted to m/s^2 for consistency with the UHRS). The key UBC parameters required to define the design spectrum are presented below:

Table 21: UBC Response Spectrum Parameters (C_a and C_v interpolated between Site Class D and E)

UBC (1997) Spectrum Definition Parameter	Value
Seismic Zone	Zone 1
Seismic Zone Factor	0.075
C_a	0.16
C_v	0.22
T_0	0.12
T_S	0.60

However, it is important to note that UBC (1997) has been superseded by the IBC (latest version 2009). An IBC defined spectrum, based on the S_s and S_1 parameters derived during this study, has also been presented in Figure 44. The key parameters are illustrated in the following table:

Table 22: IBC Response Spectrum Parameters

IBC (2009) Spectrum Definition Parameter	Value
S_s	3.8 m/s^2
S_1	1.0 m/s^2
F_a	1.75
F_v	2.95
T_0	0.086
T_S	0.432
S_{DS}	4.5 m/s^2
S_{D1}	1.9 m/s^2

7 Conclusions

The Majnoon site is located within a stable continental region; however, there is high seismic activity associated with Zagros Fault structures, about 100km east of the site. Preliminary literature review revealed that active faults, that are likely to cause ground motion associated with an earthquake, are not likely to exist at the Majnoon site. However, regional faults, at moderate distances from Majnoon, include the Zagros Foredeep fault and High Zagros Faults.

The ground motion seismic hazard levels at the sites have been estimated using probabilistic seismic hazard assessment methodology incorporating a logic tree approach. A catalogue of historical and recent earthquake records has been used to delineate broad seismic source zones for the probabilistic analysis. In addition to areal source zones, the affect of Zagros Foredeep as a fault structure has been explicitly modelled in the analysis. As the Majnoon site is located within the Mesopotamian Basin, deep basin effects have been explicitly modelled using the appropriate ground motion models.

The seismic hazard results have been presented for two return periods: 475 and 2475 years; and two shear wave velocity ($V_{s,30}$) profiles: 180 and 760m/s, consistent with soil classes D/E and B, as defined in IBC (2009).

The horizontal and vertical UHRS are presented in Table 13 to Table 19 and illustrated in Figure 41 and Figure 42. In addition, confidence levels, effects of attenuation equations and effects of individual zones contributing to the overall hazard at a particular site for PGA, 0.2-sec and 1-sec periods have been presented. The de-aggregated results are presented for PGA, 0.2-sec and 1-sec periods at different return periods. These results show that local earthquakes (with a source to site distance of between 20 and 50km) control the hazard at short response periods and earthquakes originating at Zagros Foredeep (with a source to site distance of approximately 100km) control the hazard at longer response periods. The UHRS, therefore, represents the best-estimate of hazard at the Majnoon site due to different characteristic earthquakes affecting structures with different response periods.

Horizontal and vertical UHRS are presented for multiple damping levels as requested by Shell and presented in Figure 41 and Figure 42. UBC (1997) and IBC (2009) defined response spectrum for Soil Class D/E compatible with Arup's PSHA defined spectral parameters have been presented in Figure 44.

It is recommended that a geomorphologic and field reconnaissance assessment is carried out to confirm that there are no active faults at the Majnoon site, as concluded from a literature review of Southern Iraq.

Assessment of other seismic related hazards such as liquefaction potential, induced settlements and/or shake-down settlements on the proposed facilities will be necessary as part of the design of the Majnoon project.

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Figures

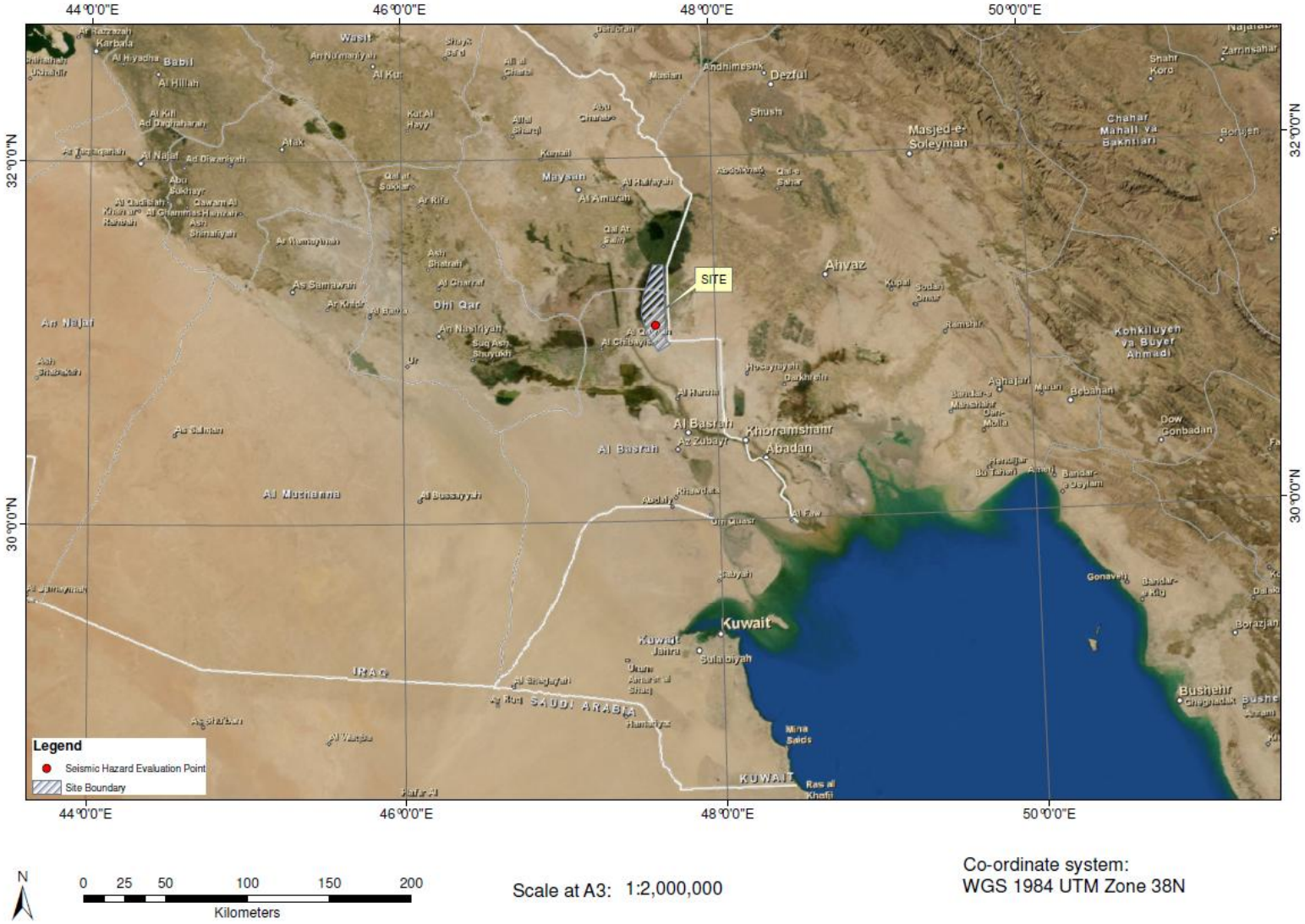
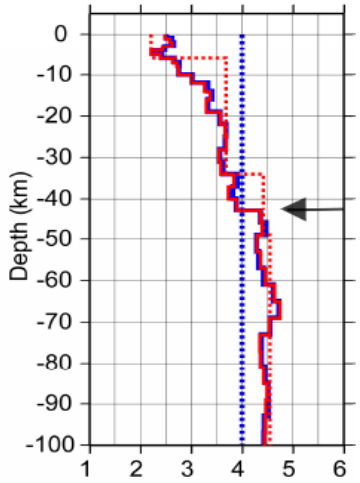
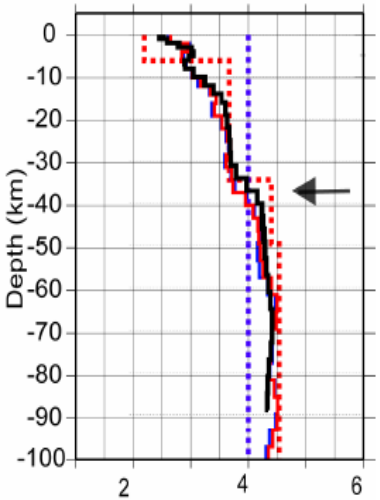


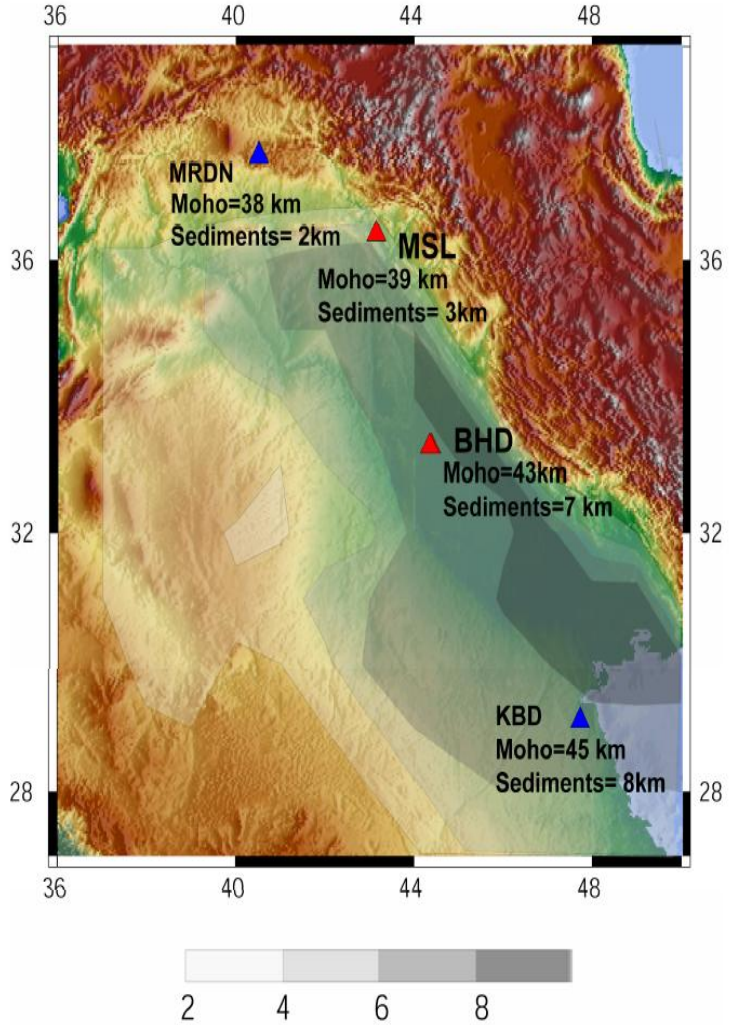
Figure 1 Regional site location. The approximate extent of Majnoon site has been indicated



Vs (km/s) at BHD



Vs (km/s) at MSL



Sediment thickness in the Mesopotamian Basin (Km)

Figure 2 Sediment thickness and crustal velocity profiles in the Mesopotamian Basin (from Gok *et al.*, 2006)

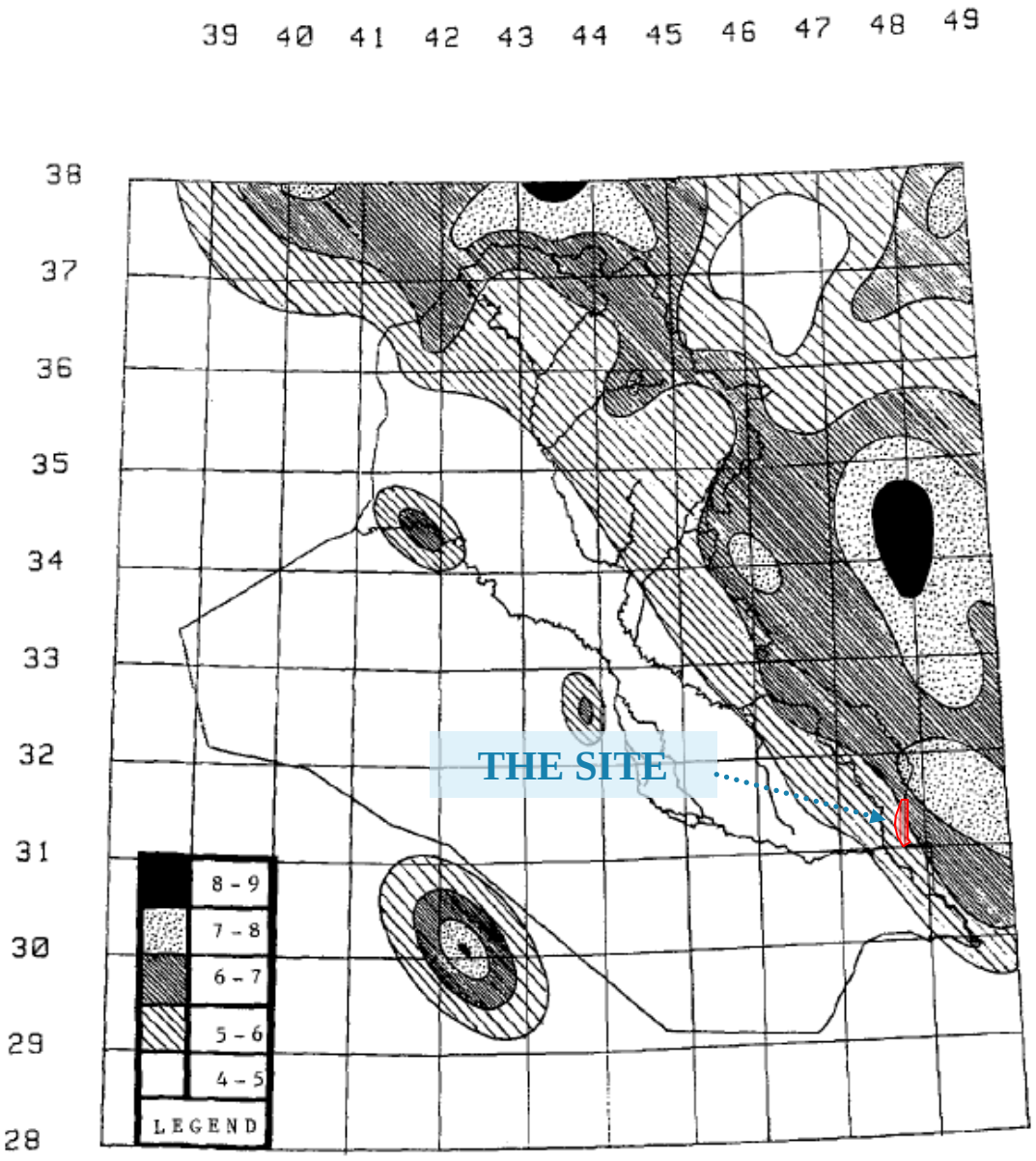


Figure 3 Maximum observed intensity zoning map for Iraq (Fahmi & Al-Abbassi, 1989) . Iso-intensity contour values are Modified Mercalli 'I0'. The approximate location of the Majnoon site is also indicated

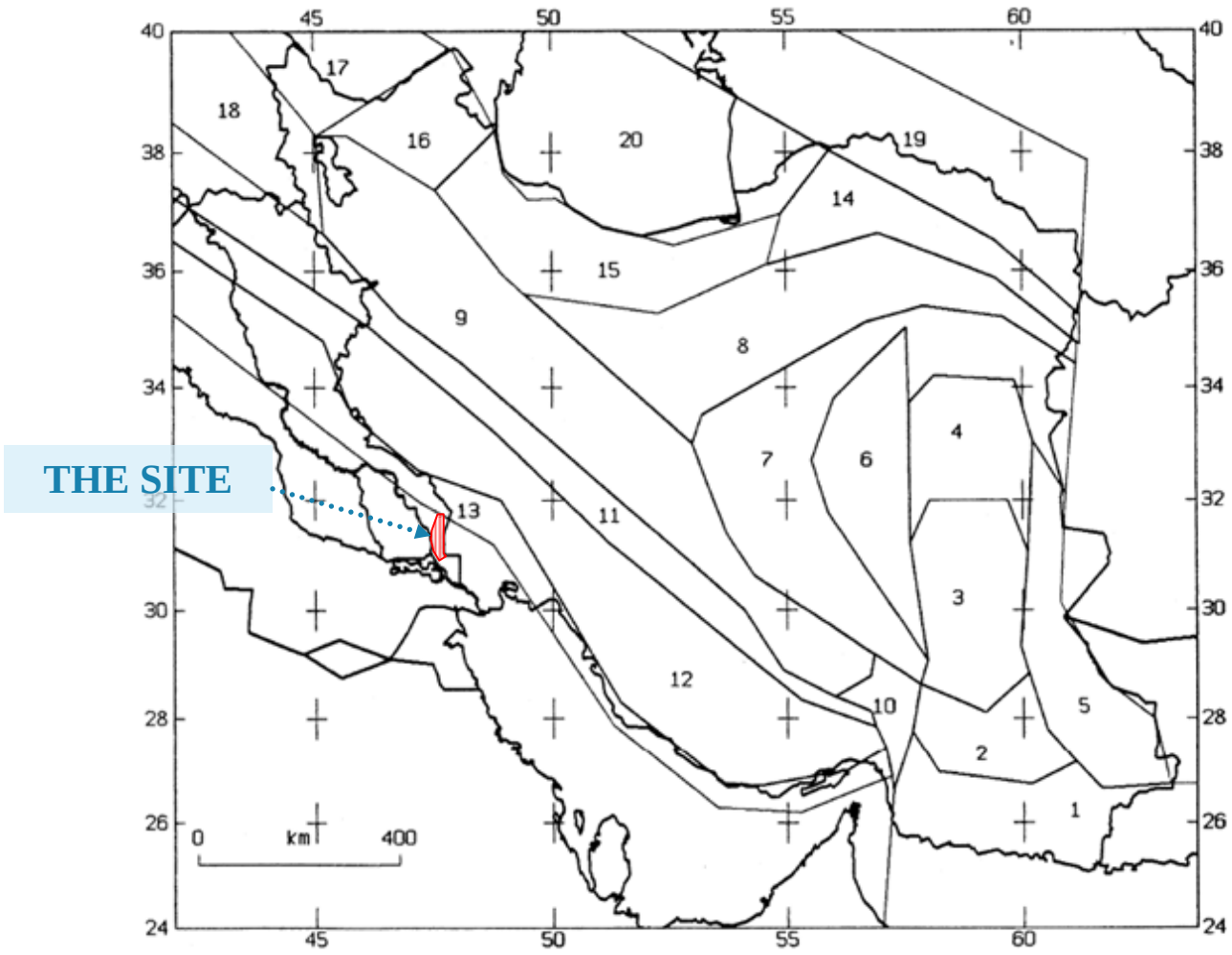


Figure 4 GSHAP Source model map as developed by Tavakoli and Ghaforty-Ashtiany (1999)

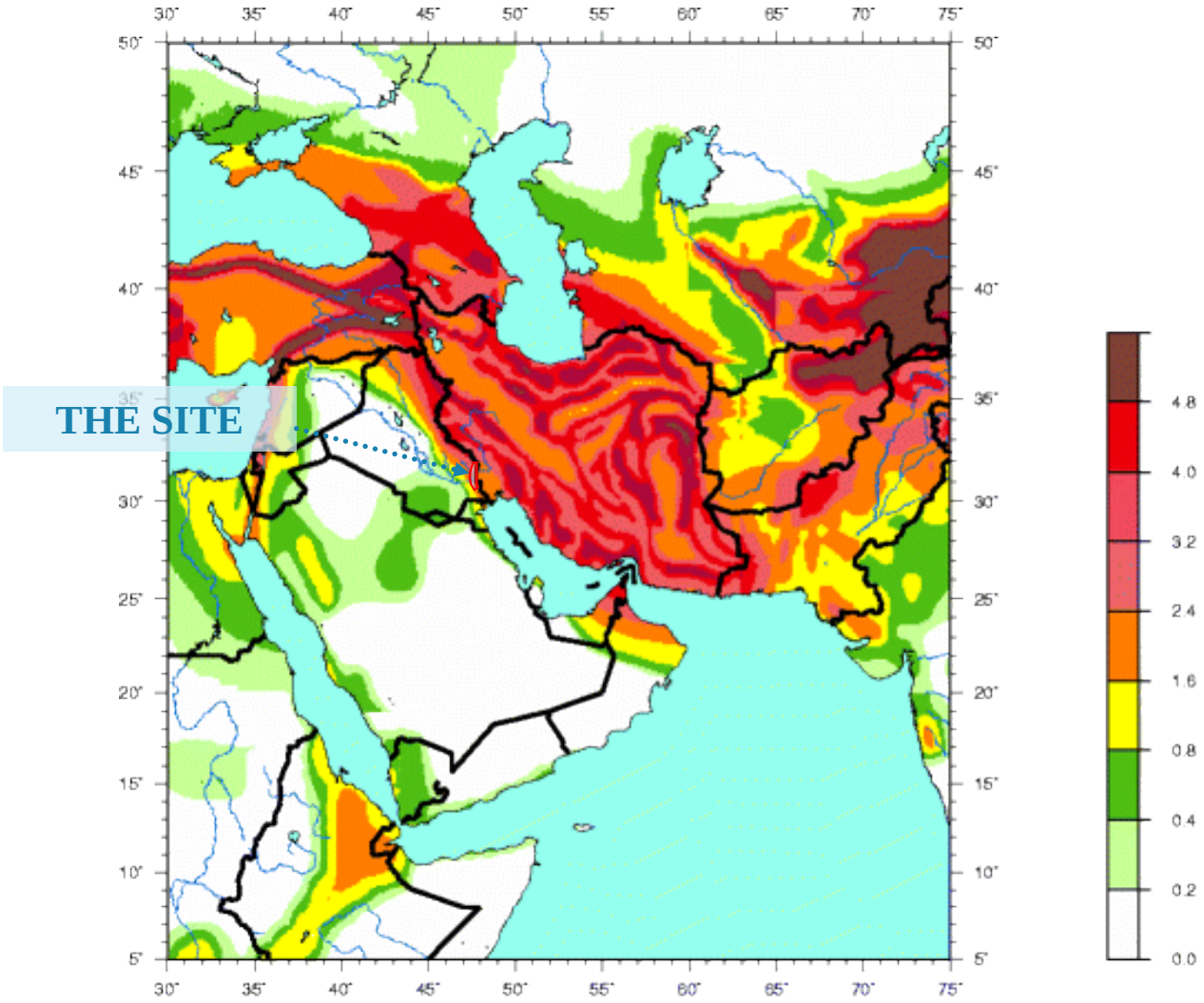


Figure 5 Probabilistic Seismic Hazard Map derived by the GSHAP covering the Middle East region (Grunthal *et al.*, 1999). The values reported correspond to PGA for a 475 year return period at stiff soil sites

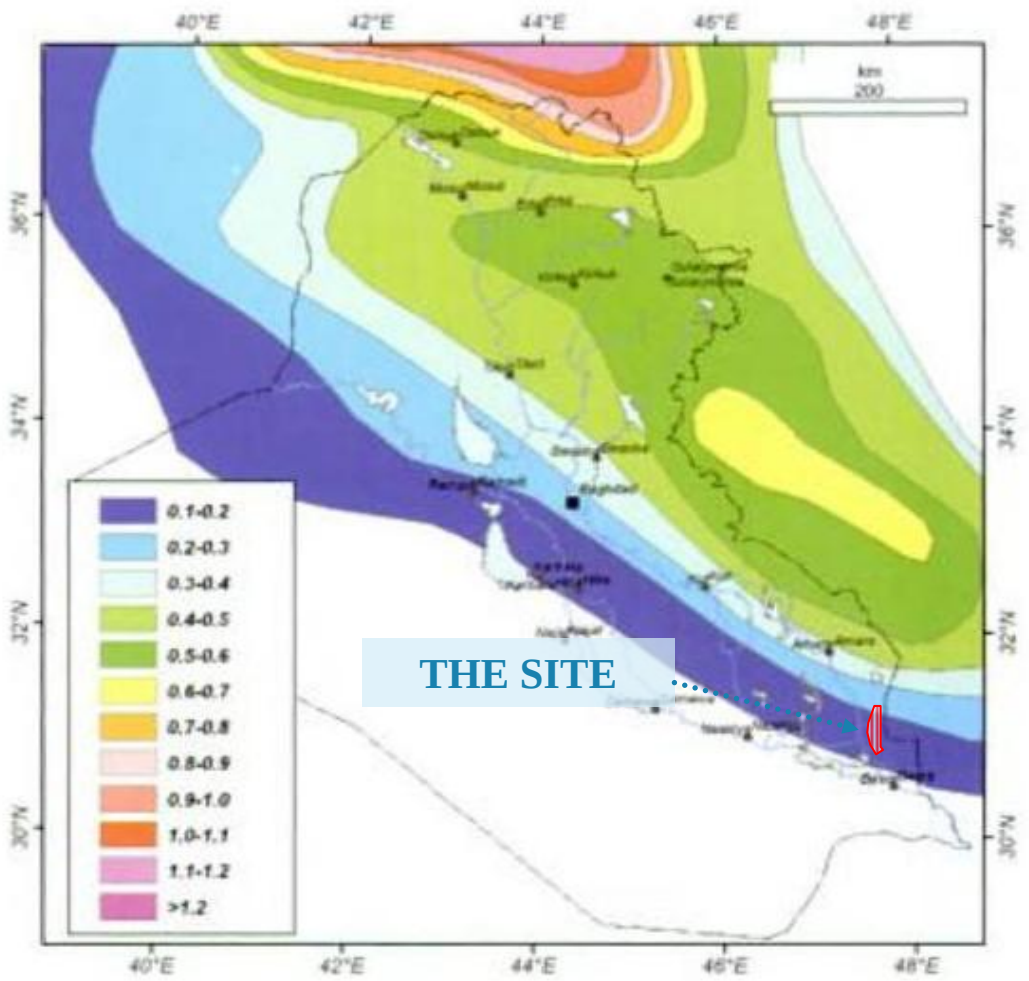


Figure 6 Seismic Hazard Map of Iraq derived by the Alsinawi and Al-Qasrani. The values reported correspond to PGA for a 100 year return period at rock sites

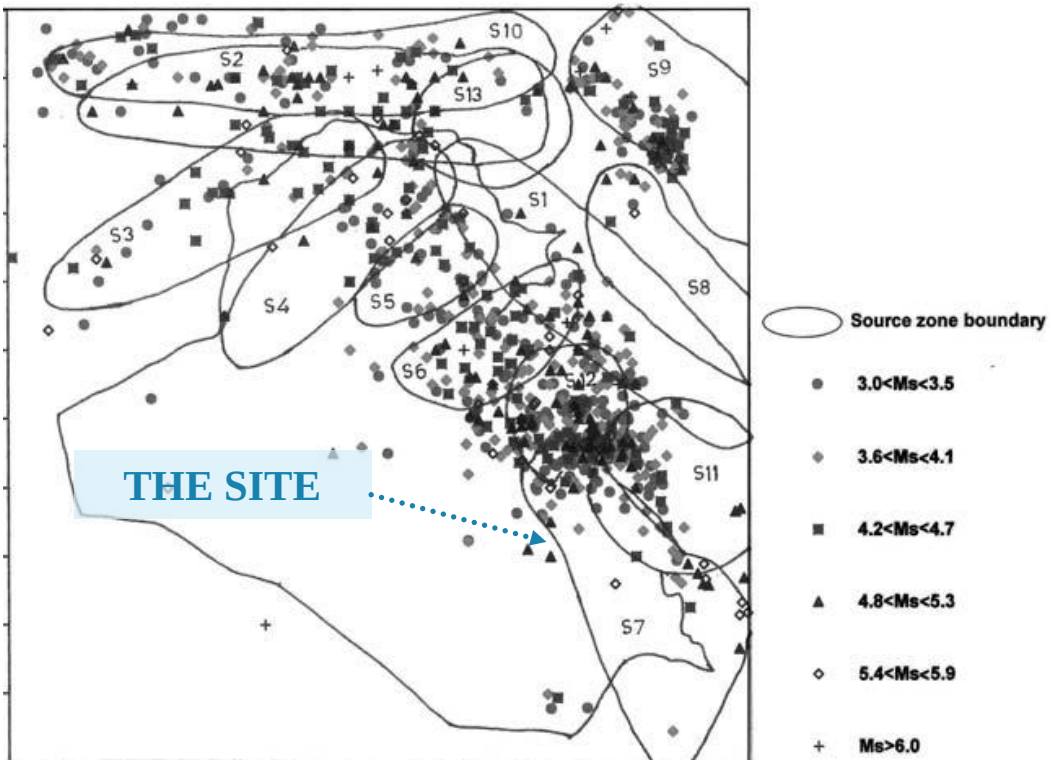


Figure 7 Source Model Developed by Ameer *et al.* (2005)

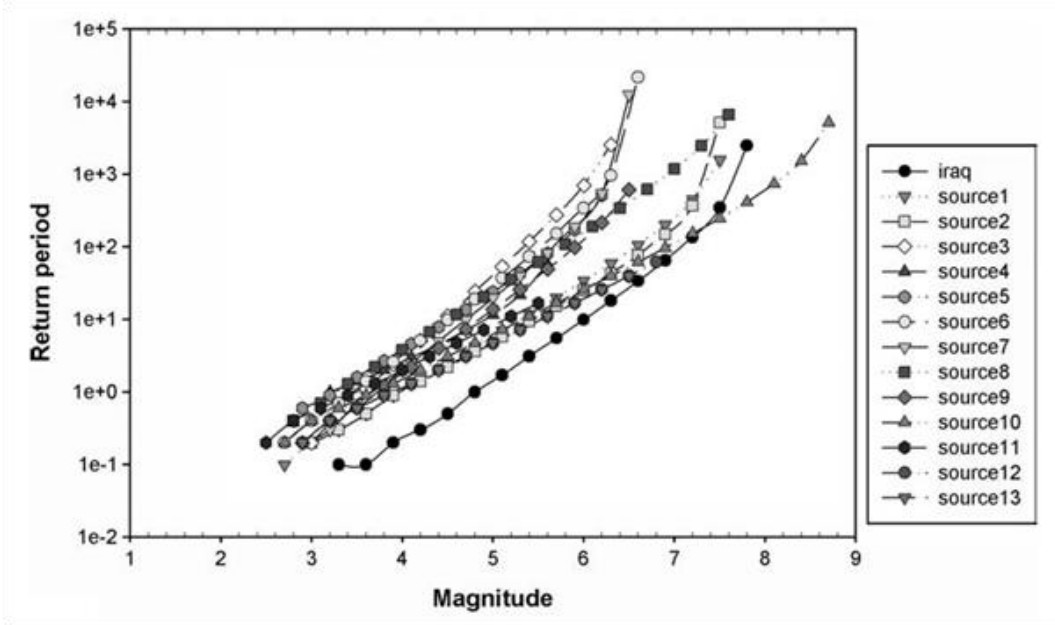
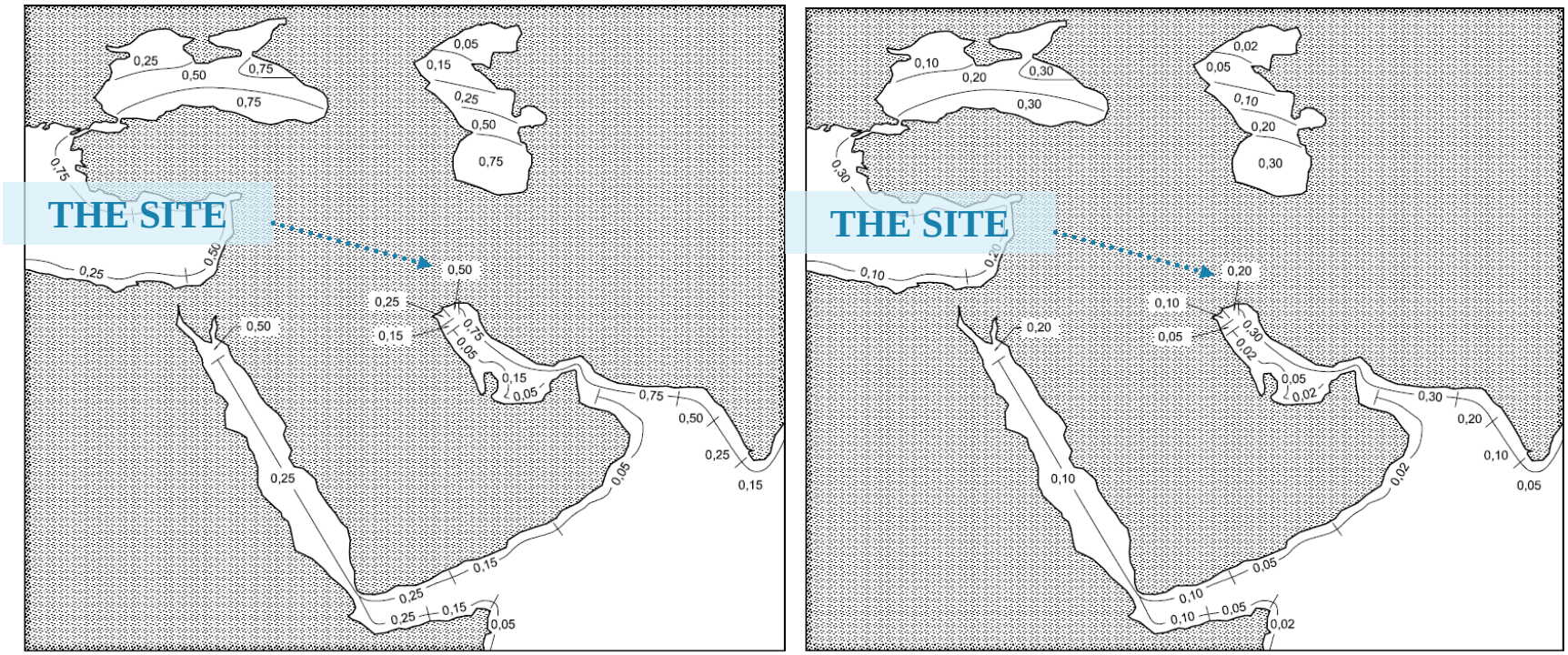


Figure 8 Return Period magnitude curves for the 13 area sources used by Ameer *et al.* (2005)



(a) Spectral Ordinate at 0.2 second (b) Spectral ordinate at 1.0 seconds

Figure 9 ISO 19901-Part 2 Seismic Design Values for 5% Damping at 1,000 year return period

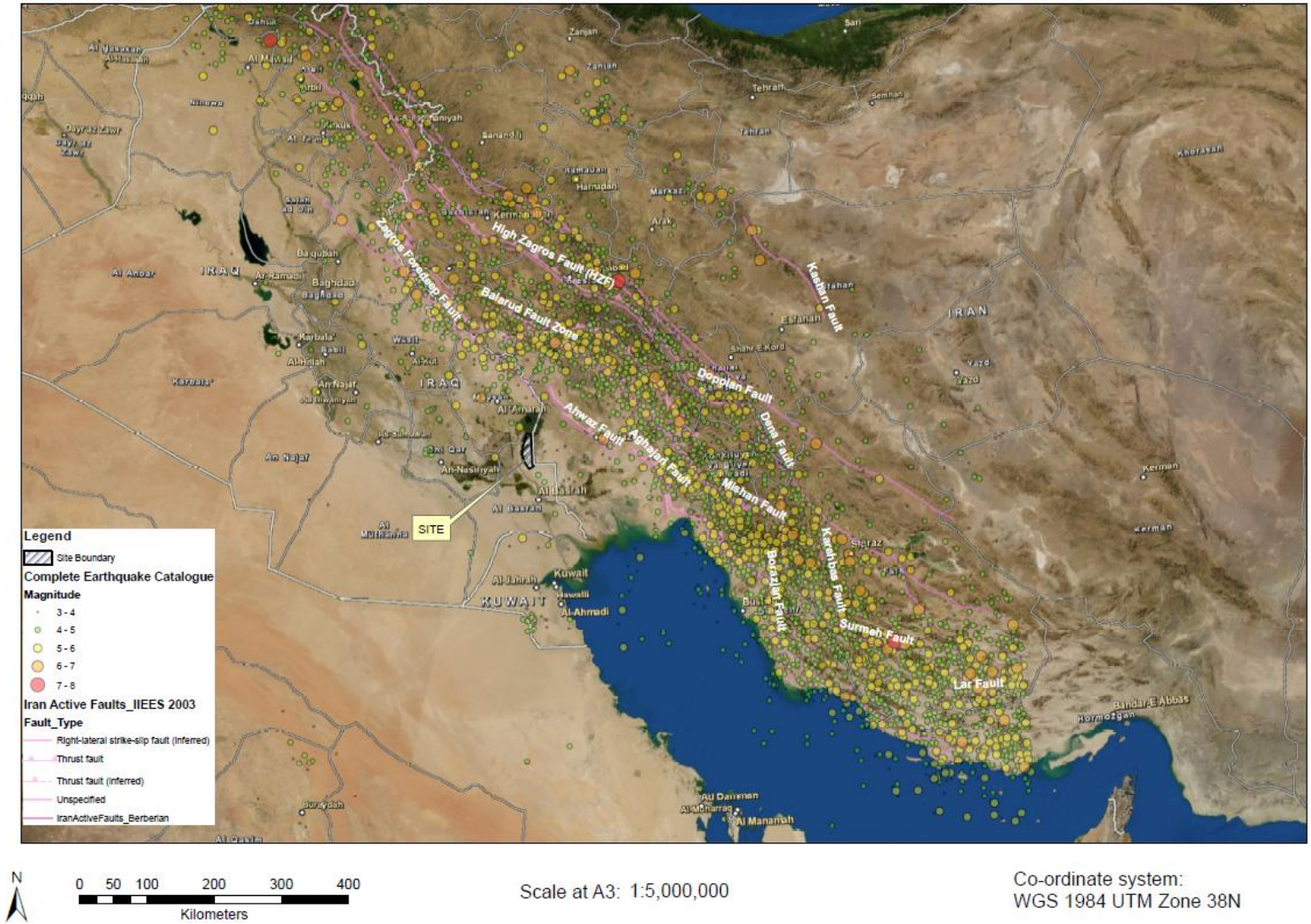


Figure 10 Complete Earthquake Catalogue (-300BC to 2011AD)

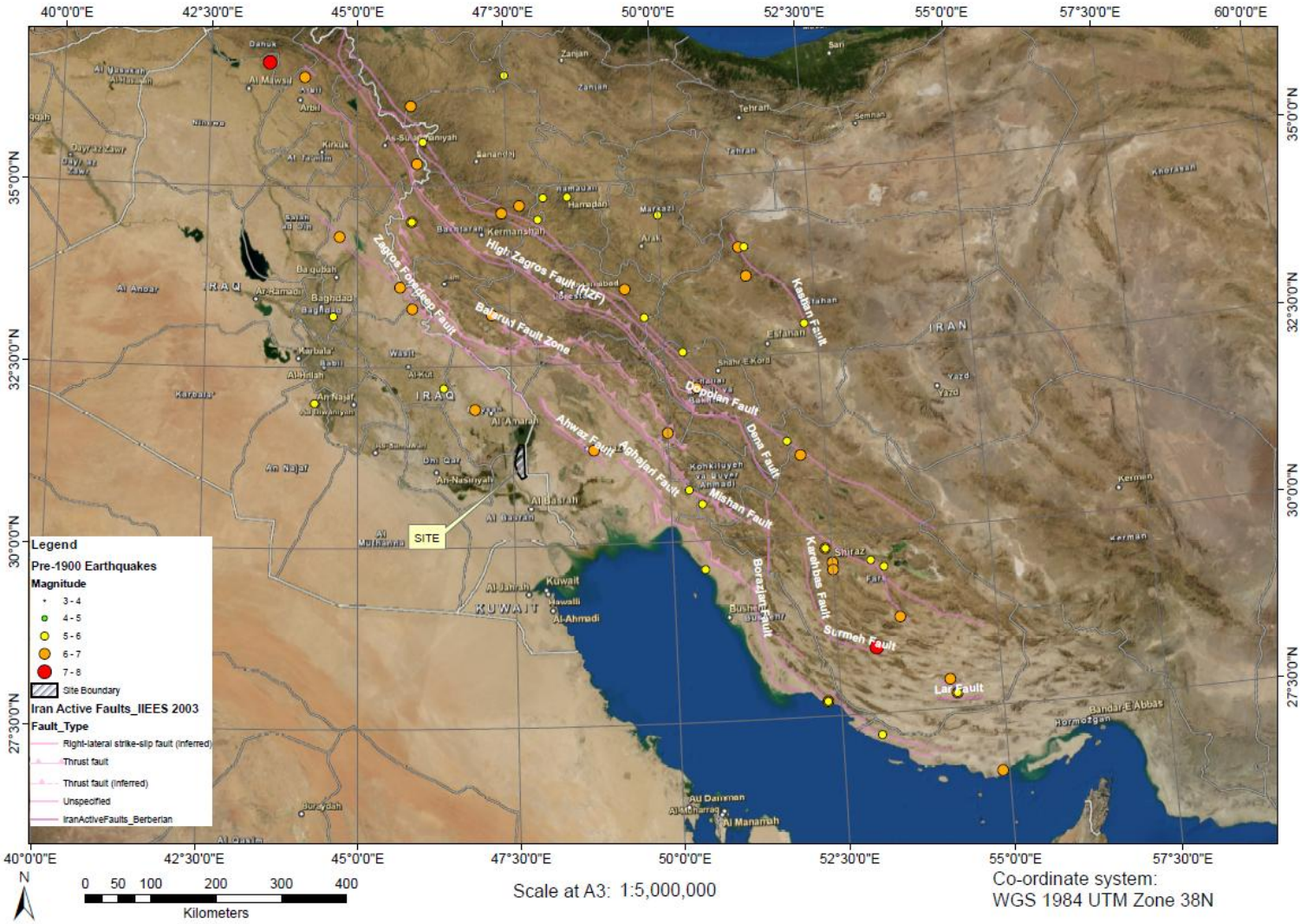


Figure 11 Historical (Pre-1900) Earthquake Catalogue

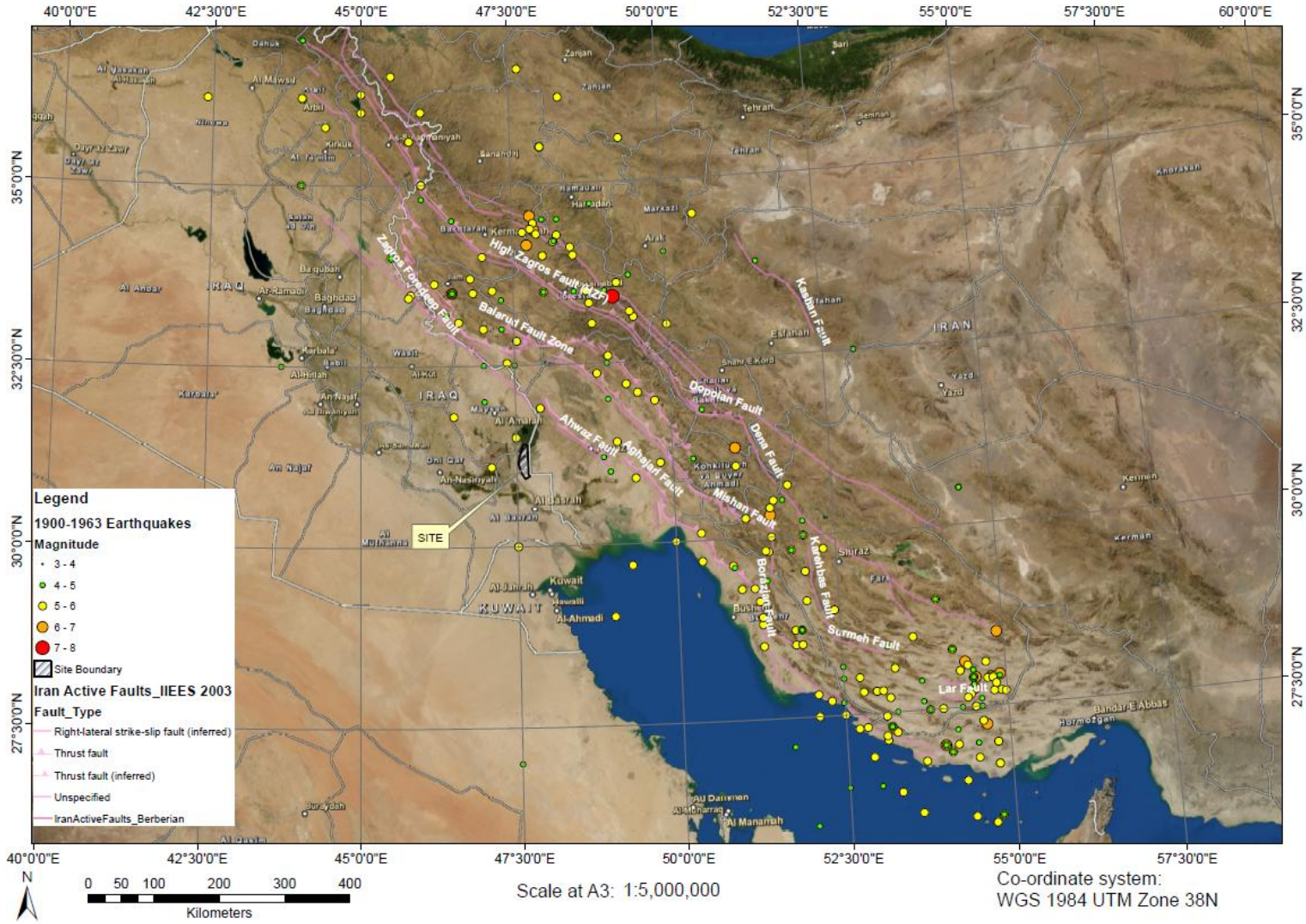


Figure 12 Early Instrumental earthquake catalogue (recorded between 1900 and 1964)

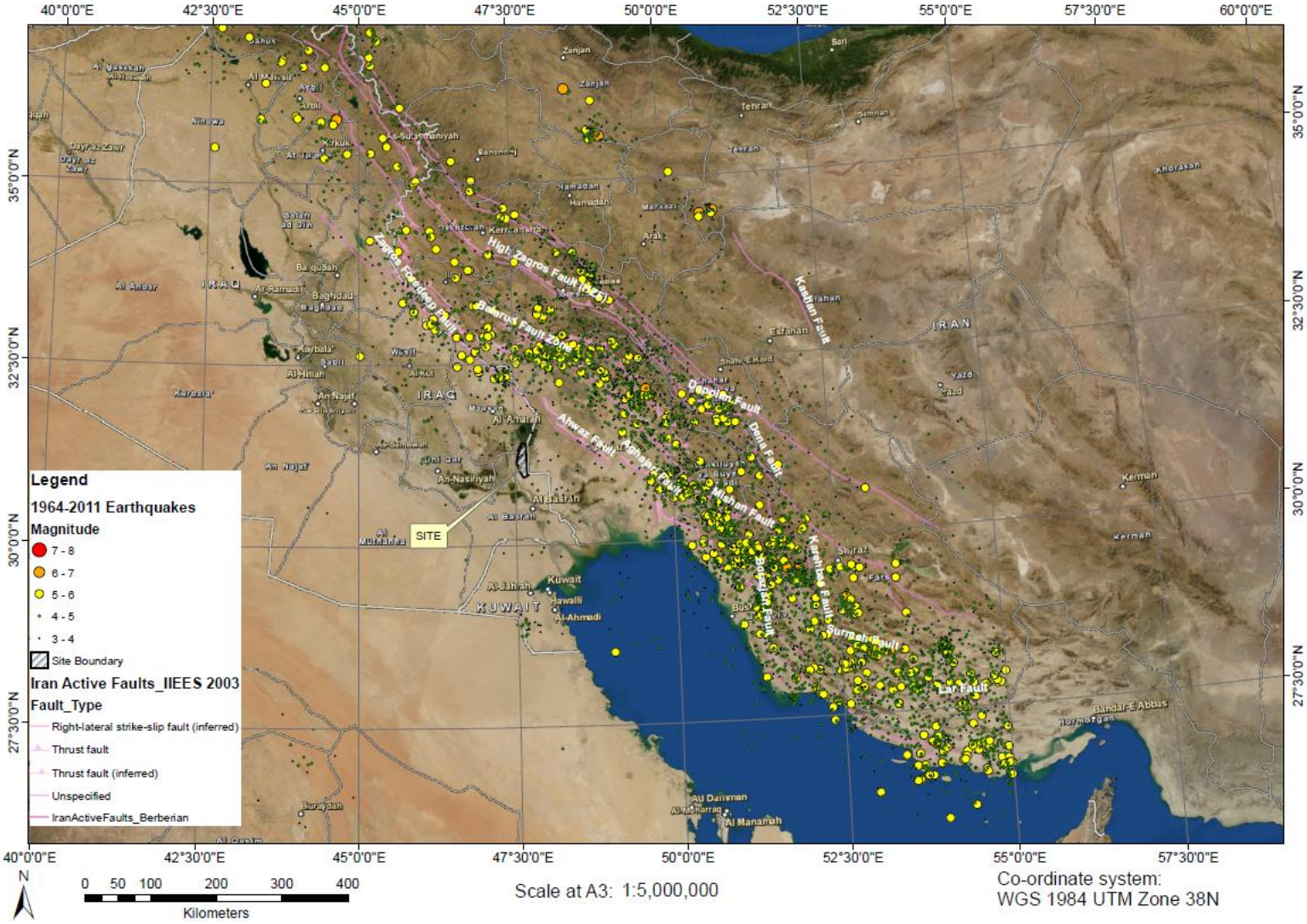


Figure 13 Modern Instrumental earthquake catalogue (recorded between 1964 and 2011)

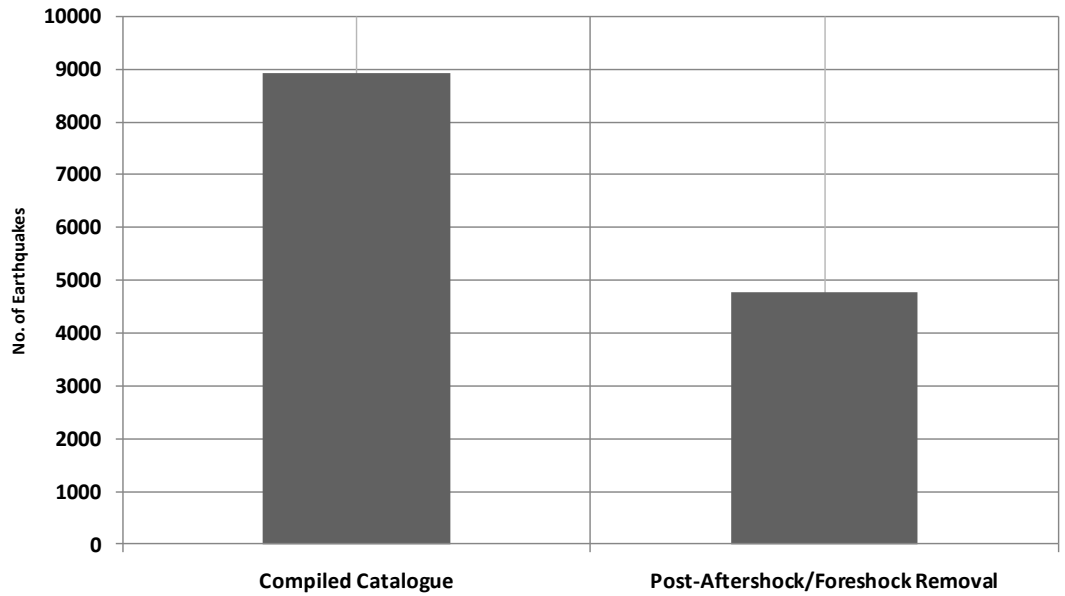
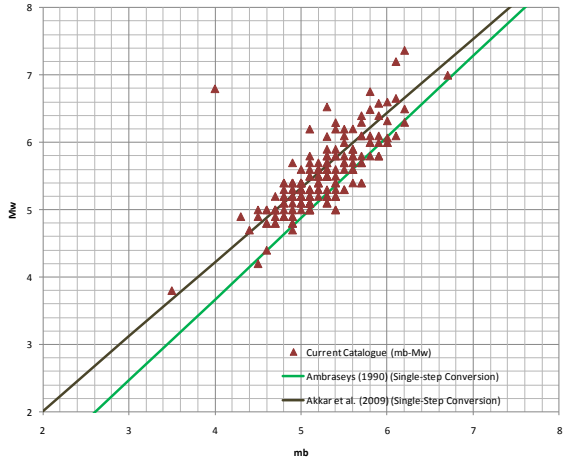
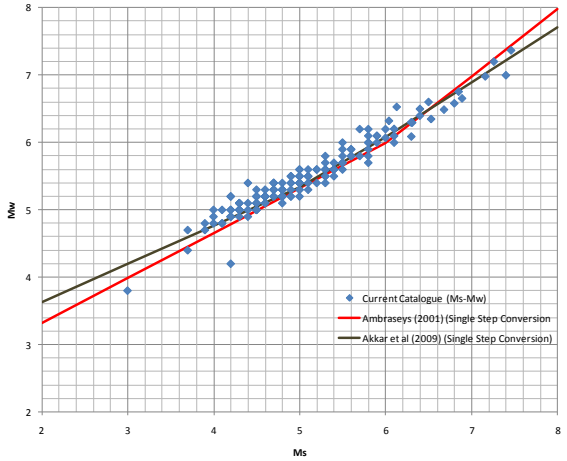


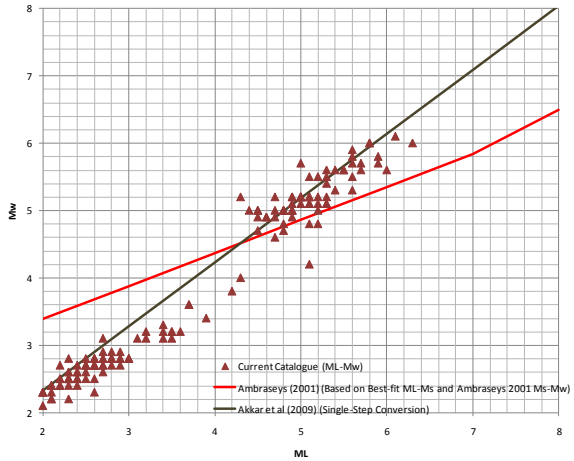
Figure 14 Effects of catalogue filtering and foreshock/aftershock removal



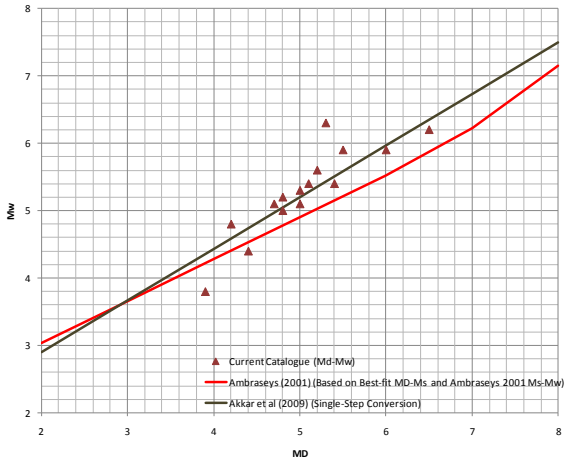
(a) m_b-M_W



(b) M_S-M_W


Mw
ML
Current Catalogue (ML-Mw)
Ambraseys (2001) (Based on Best-fit ML-Ms and Ambraseys 2001 Ms-Mw)
Akkar et al (2009) (Single-Step Conversion)

(c) M_L-M_W


Mw
MD
Current Catalogue (Md-Mw)
Ambraseys (2001) (Based on Best-fit MD-Ms and Ambraseys 2001 Ms-Mw)
Akkar et al (2009) (Single-Step Conversion)

(d) M_D-M_W

Figure 15 Magnitude Conversion relationships

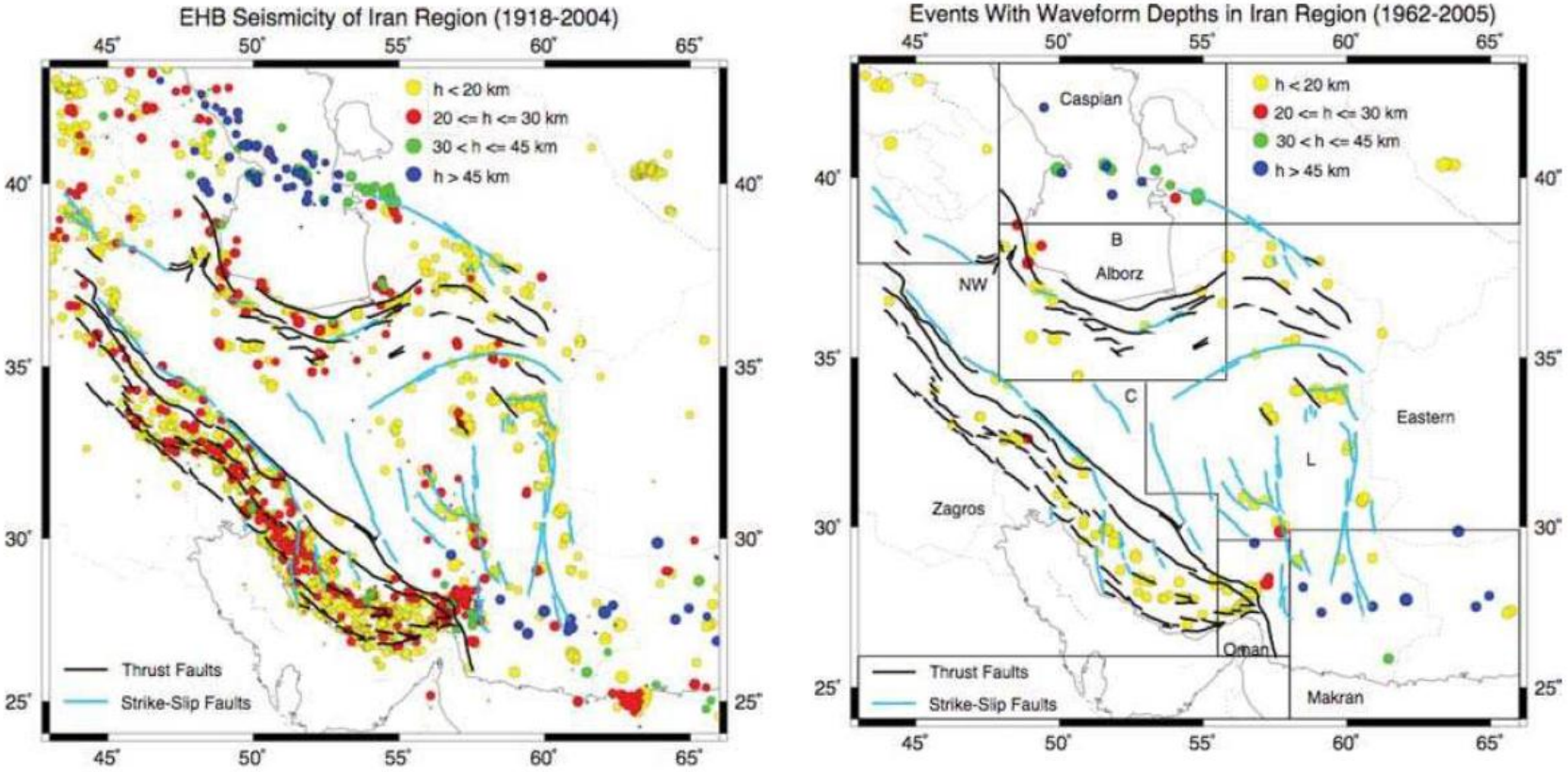


Figure 16 Distribution of Seismicity in the Zagros region (Engdahl *et al.*, 2006)

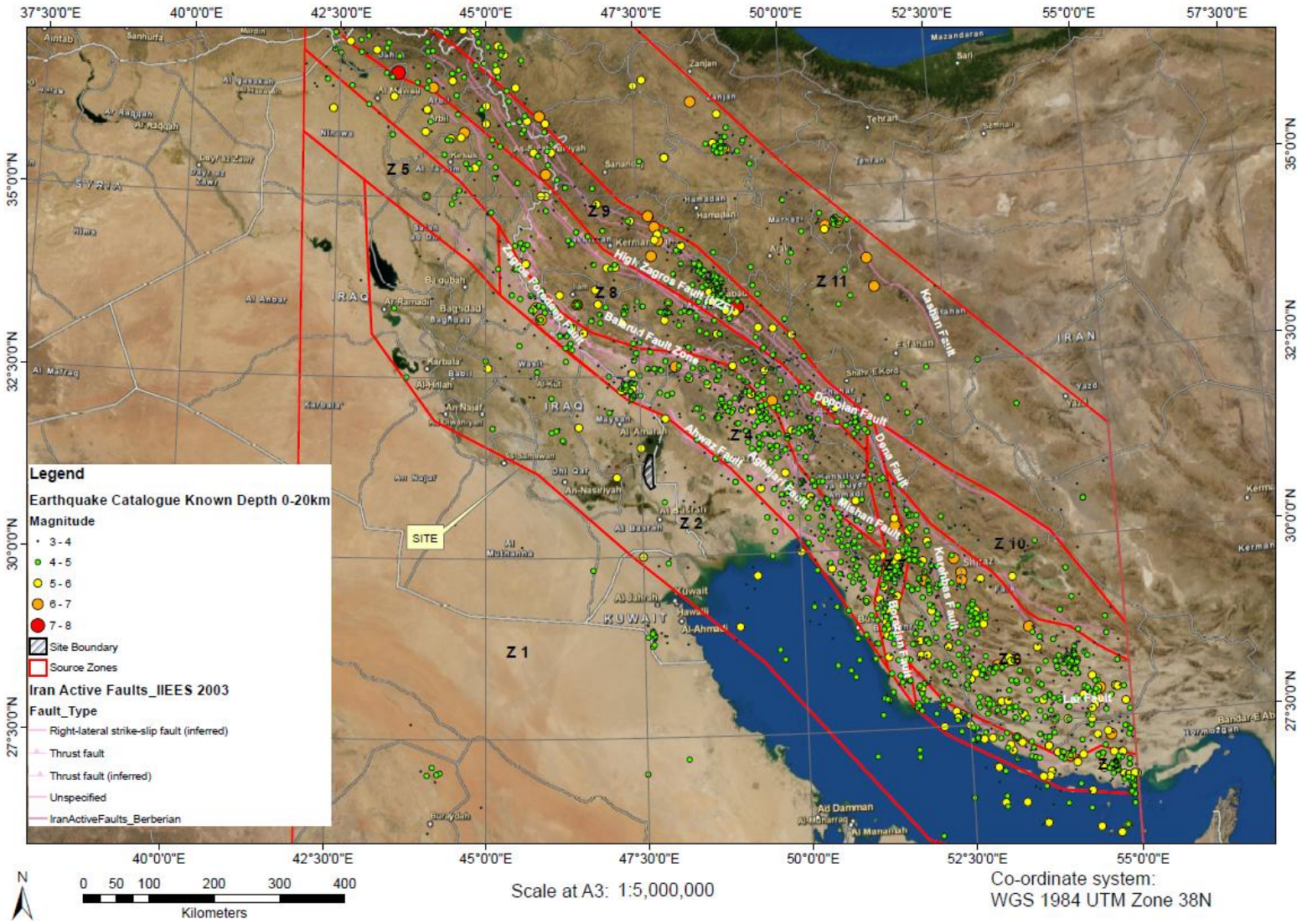


Figure 17 Distribution of earthquakes at a known depth of 0-20 km

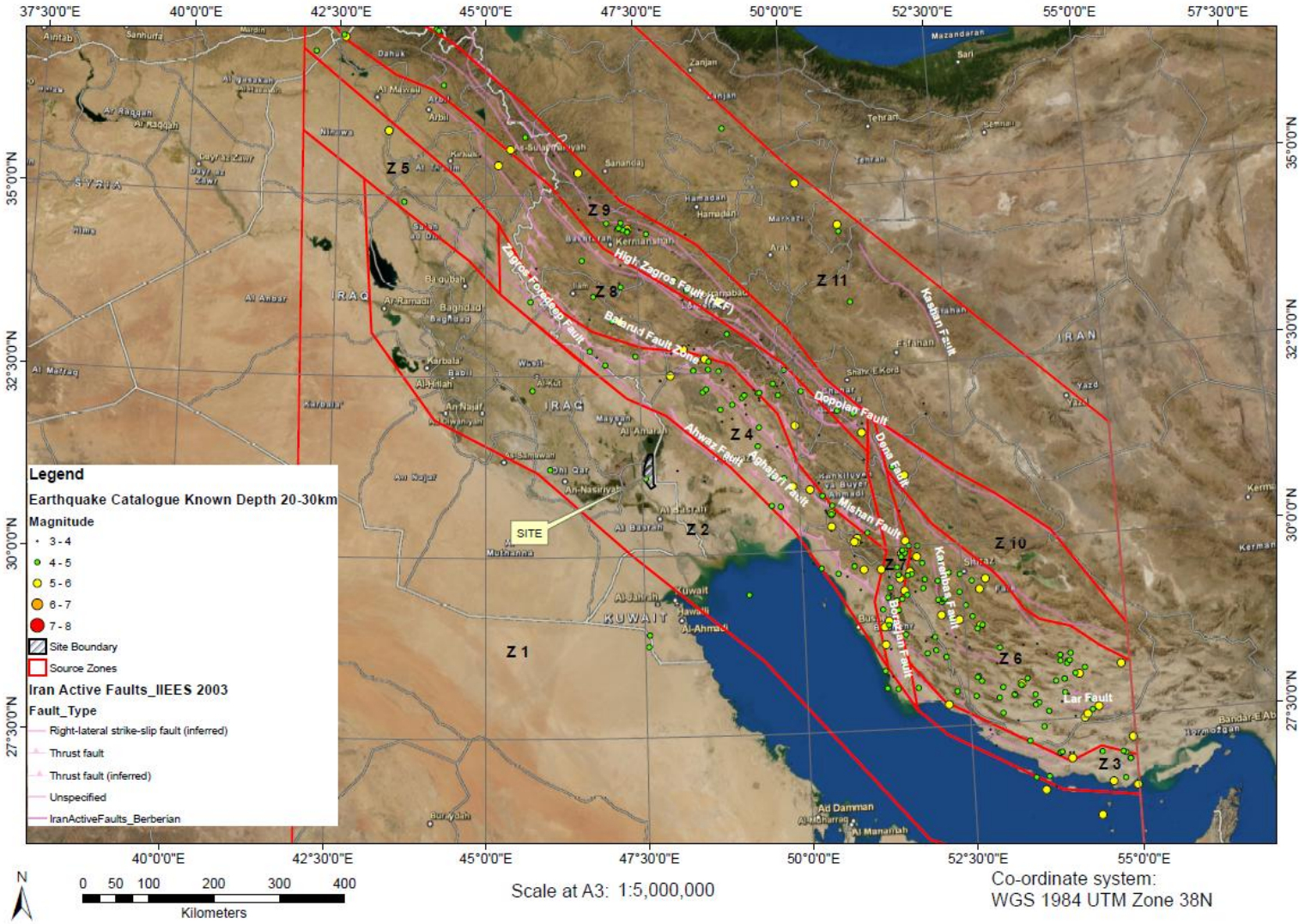


Figure 18 Distribution of earthquakes at a known depth of 20-30 km

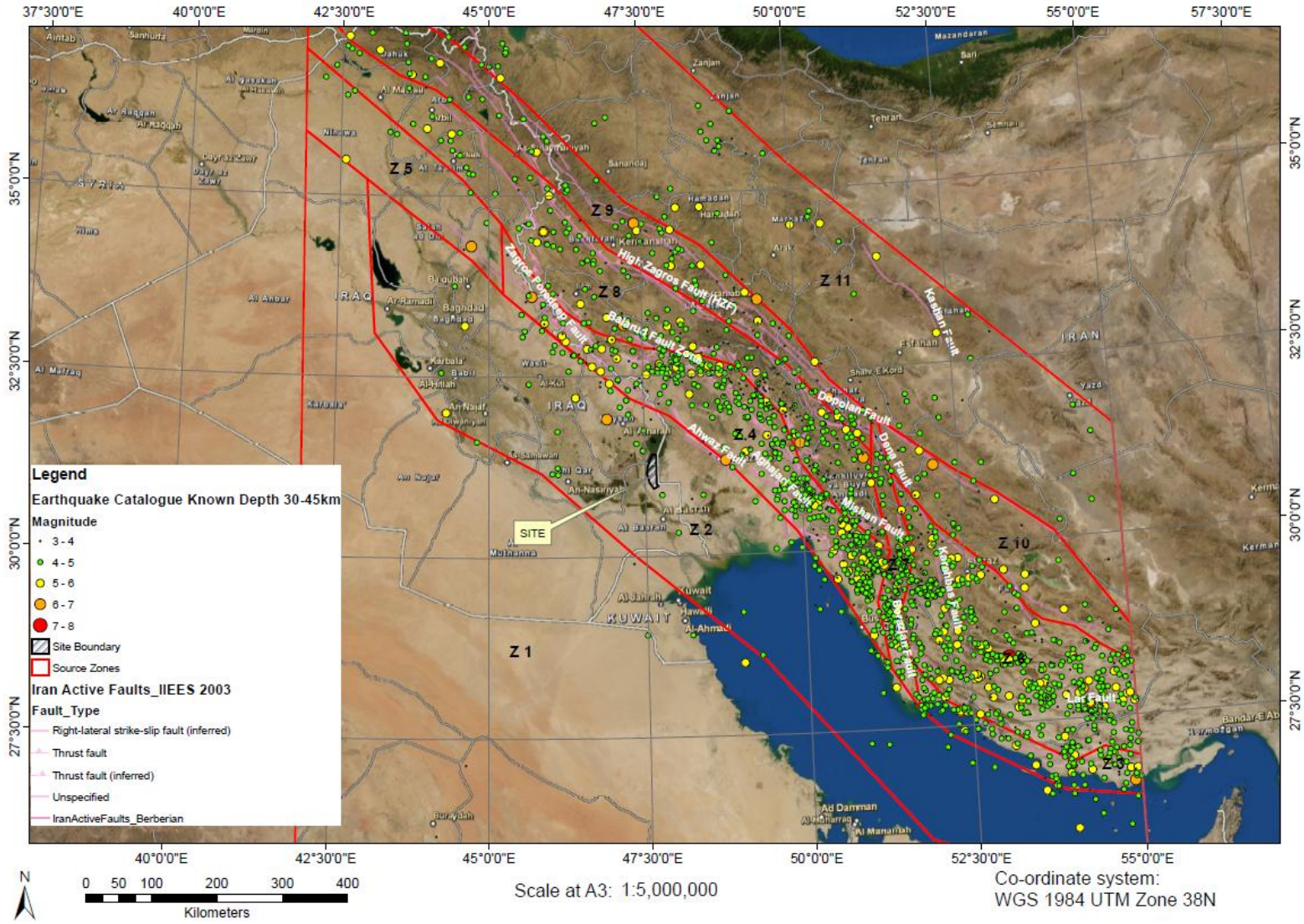


Figure 19 Distribution of earthquakes at a known depth of 30-45 km

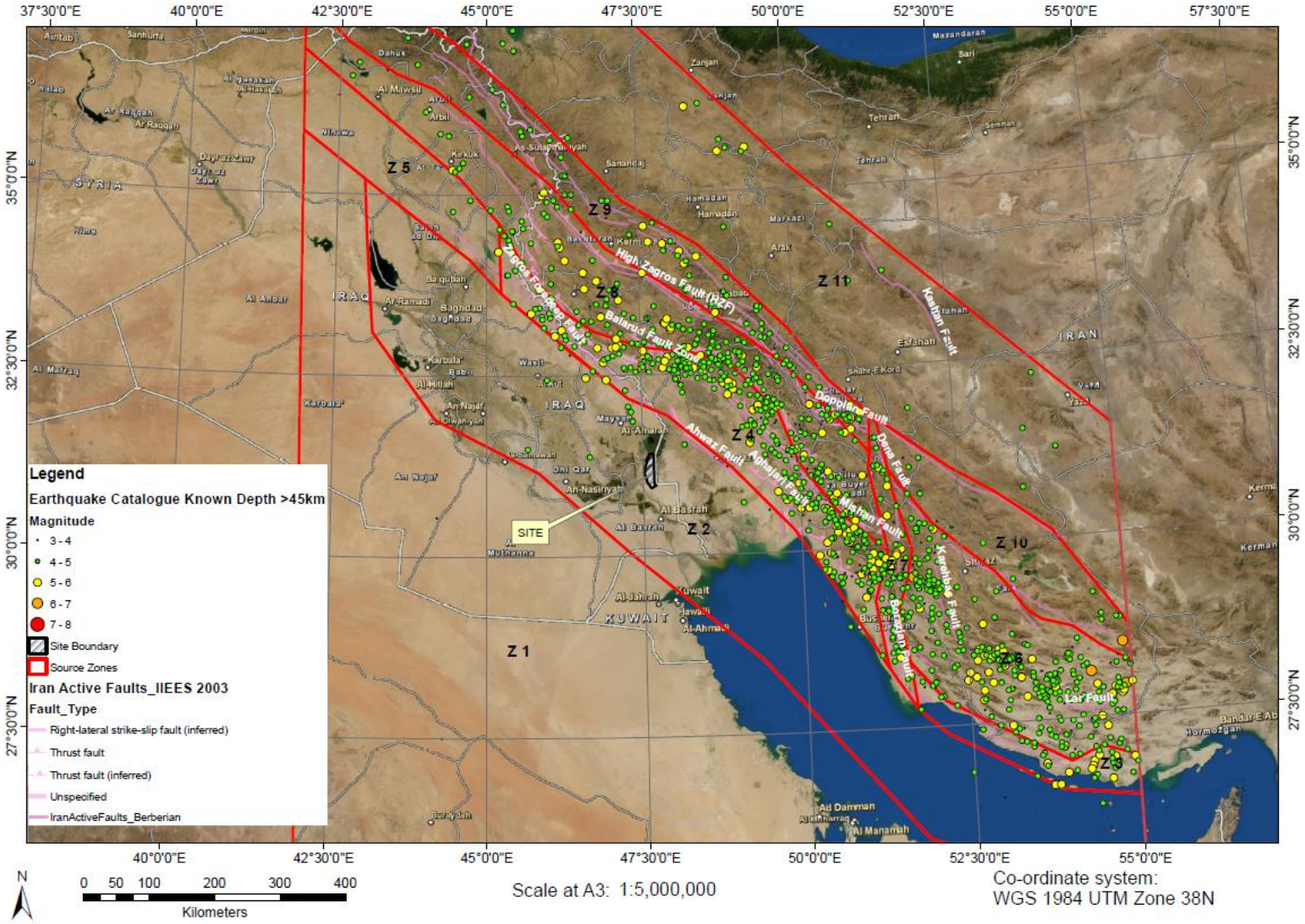


Figure 20 Distribution of earthquakes at a known depth of > 45 km

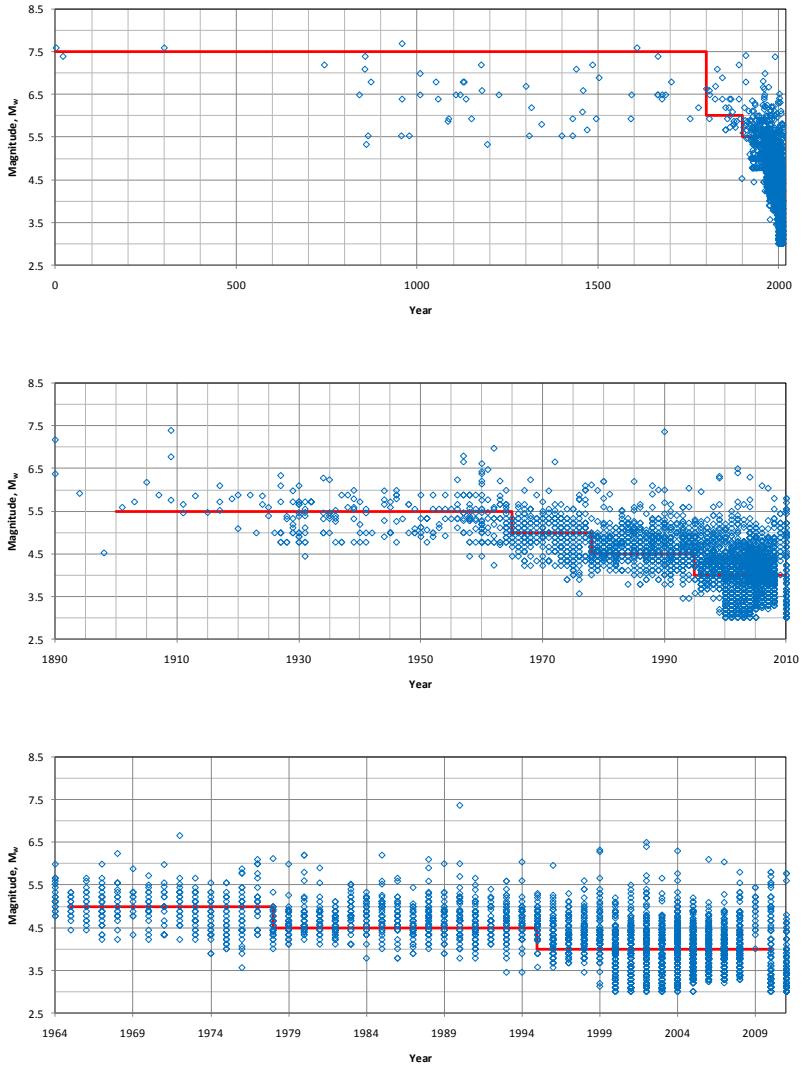


Figure 21 Catalogue completeness assessment – completeness thresholds

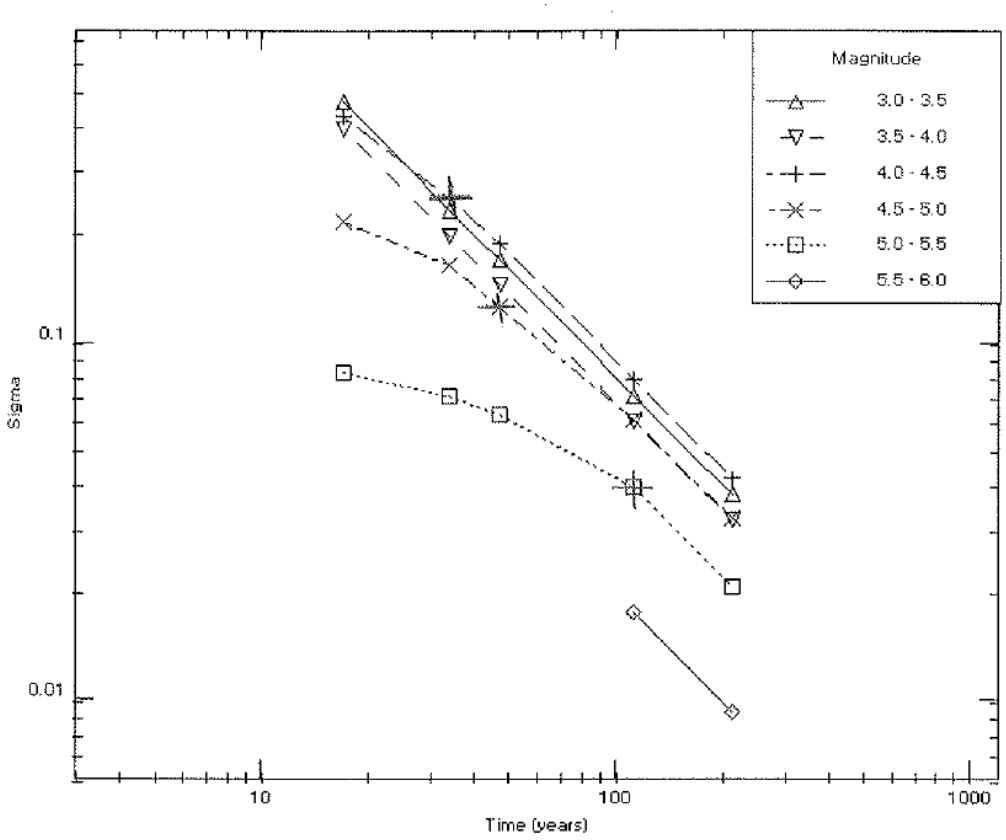


Figure 22 Catalogue completeness assessment – Stepp (1972) recurrence plot

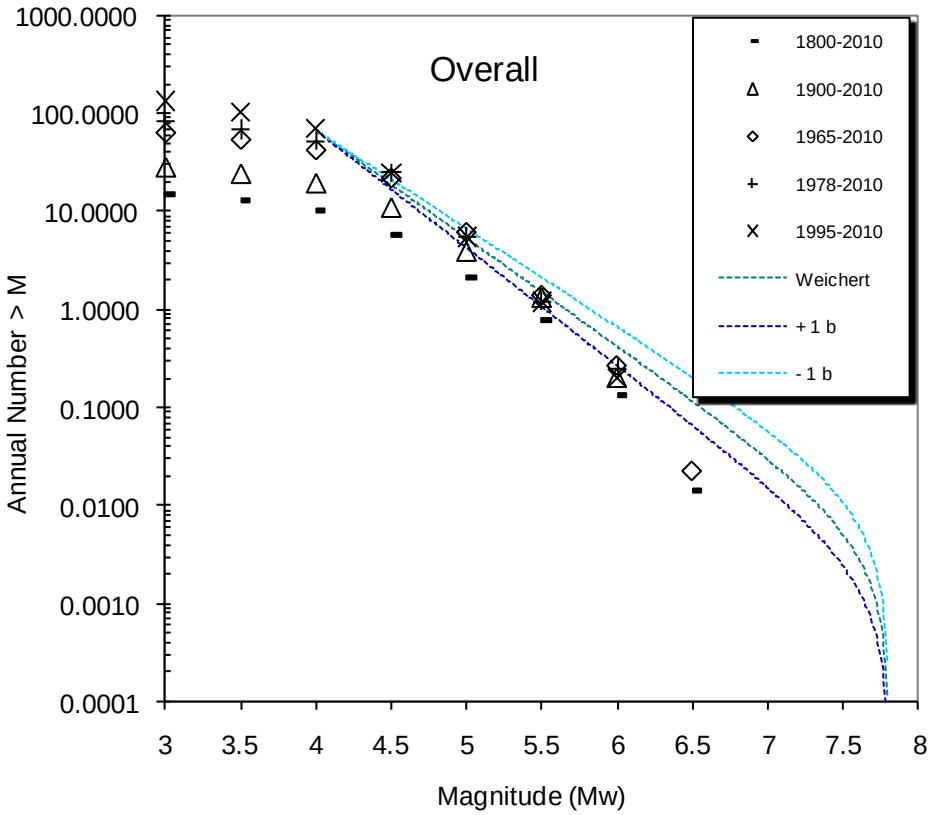


Figure 23 Completeness assessment based on the Gutenberg-Richter Plot

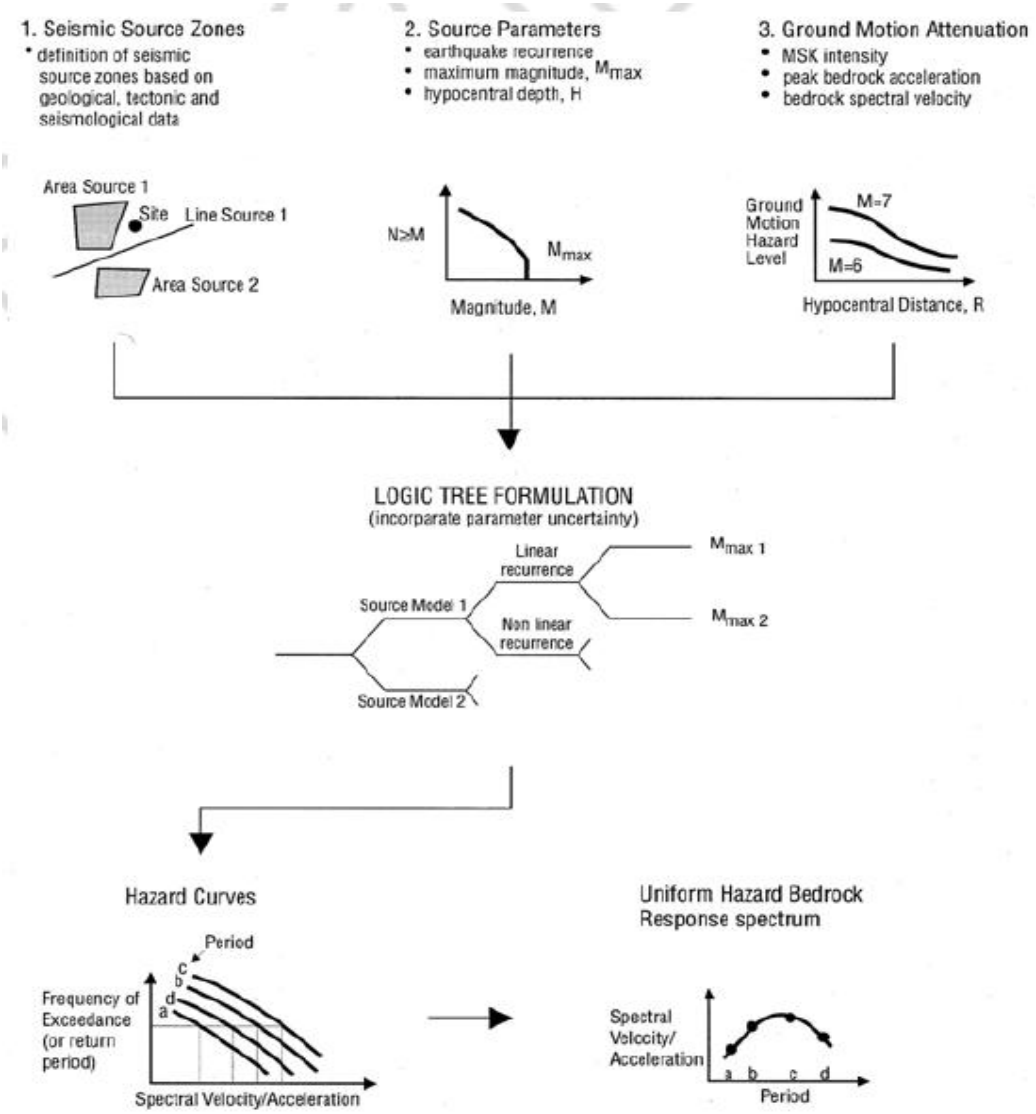


Figure 24 Probabilistic Seismic Hazard Assessment Methodology

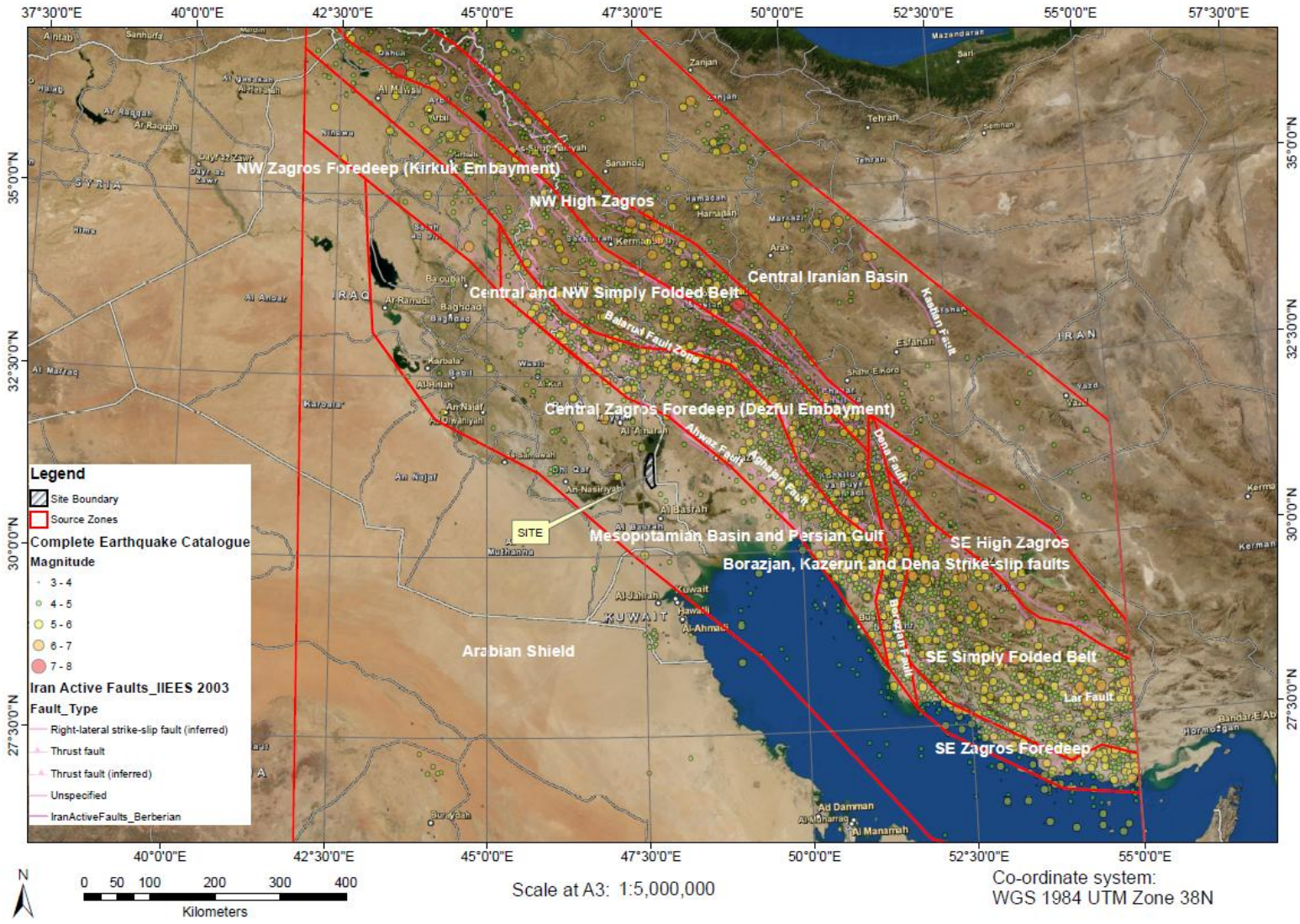


Figure 25 Seismic Source Model

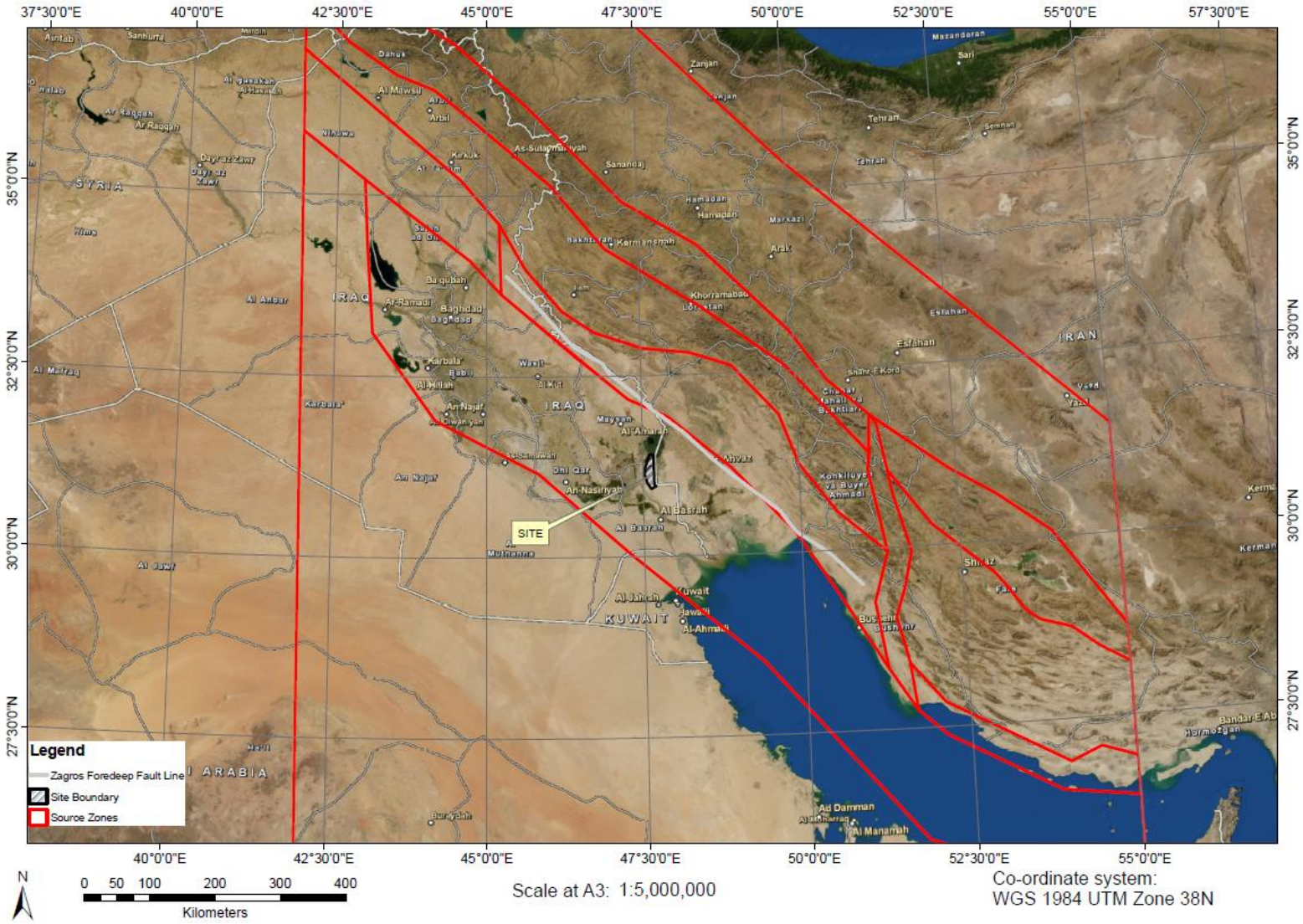


Figure 26 Alternative Seismic Source Model with location of modelled Zagros Foredeep Fault

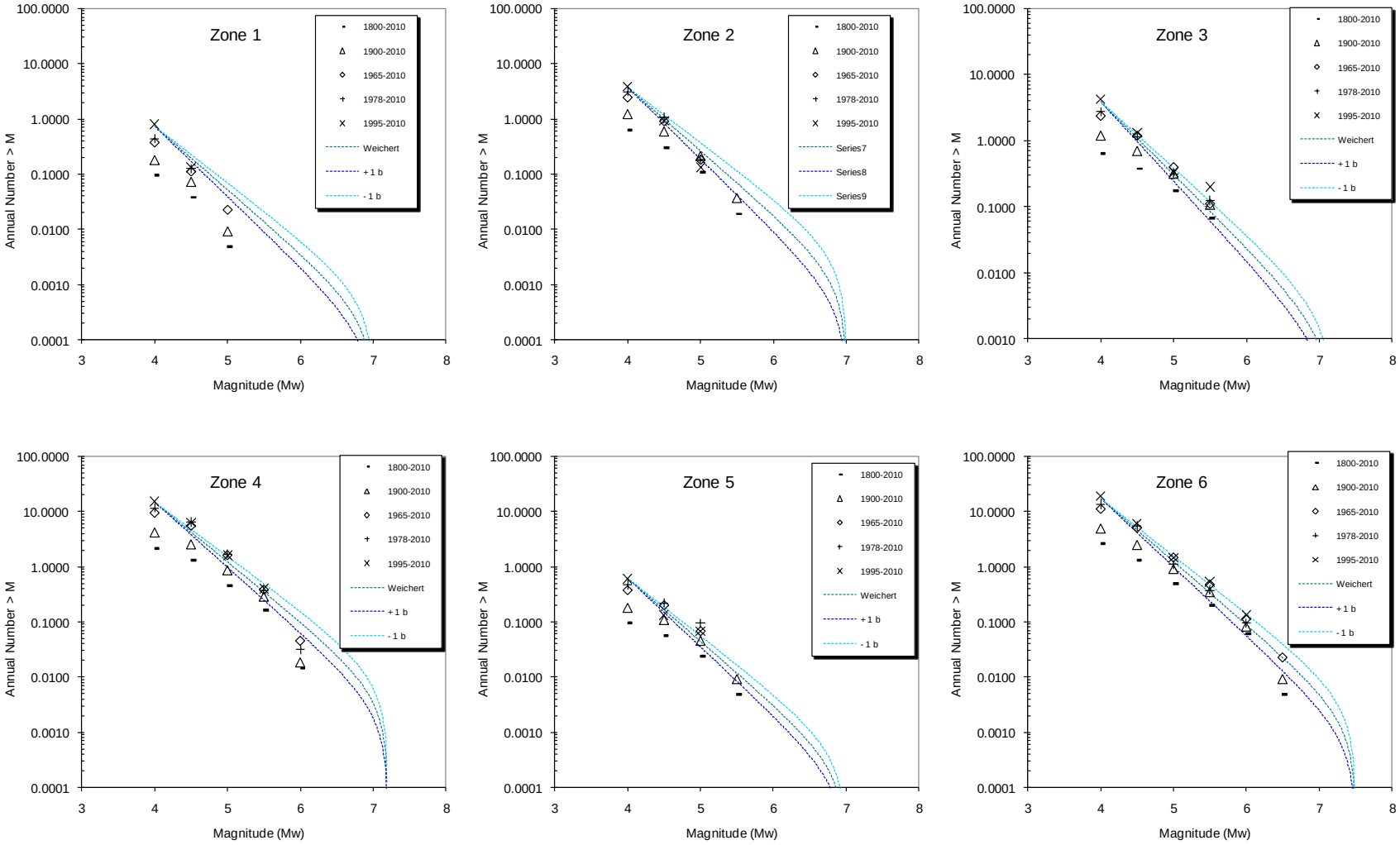


Figure 27 Magnitude Recurrence Parameters (Zones 1 – 6)

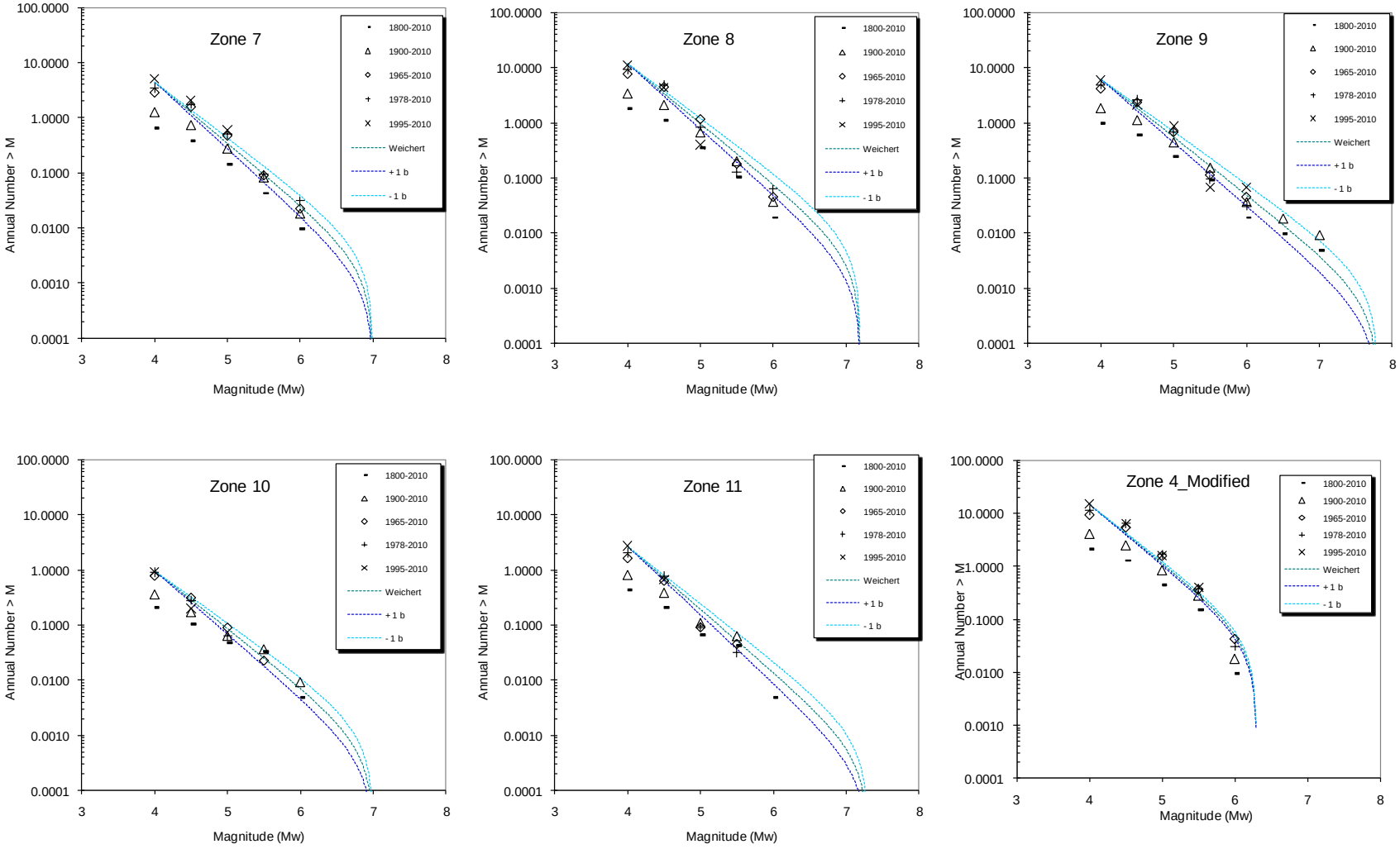


Figure 28 Magnitude Recurrence Parameters (Zones 7 – 11 and Modified Zone 4, referred to as Zone 12)

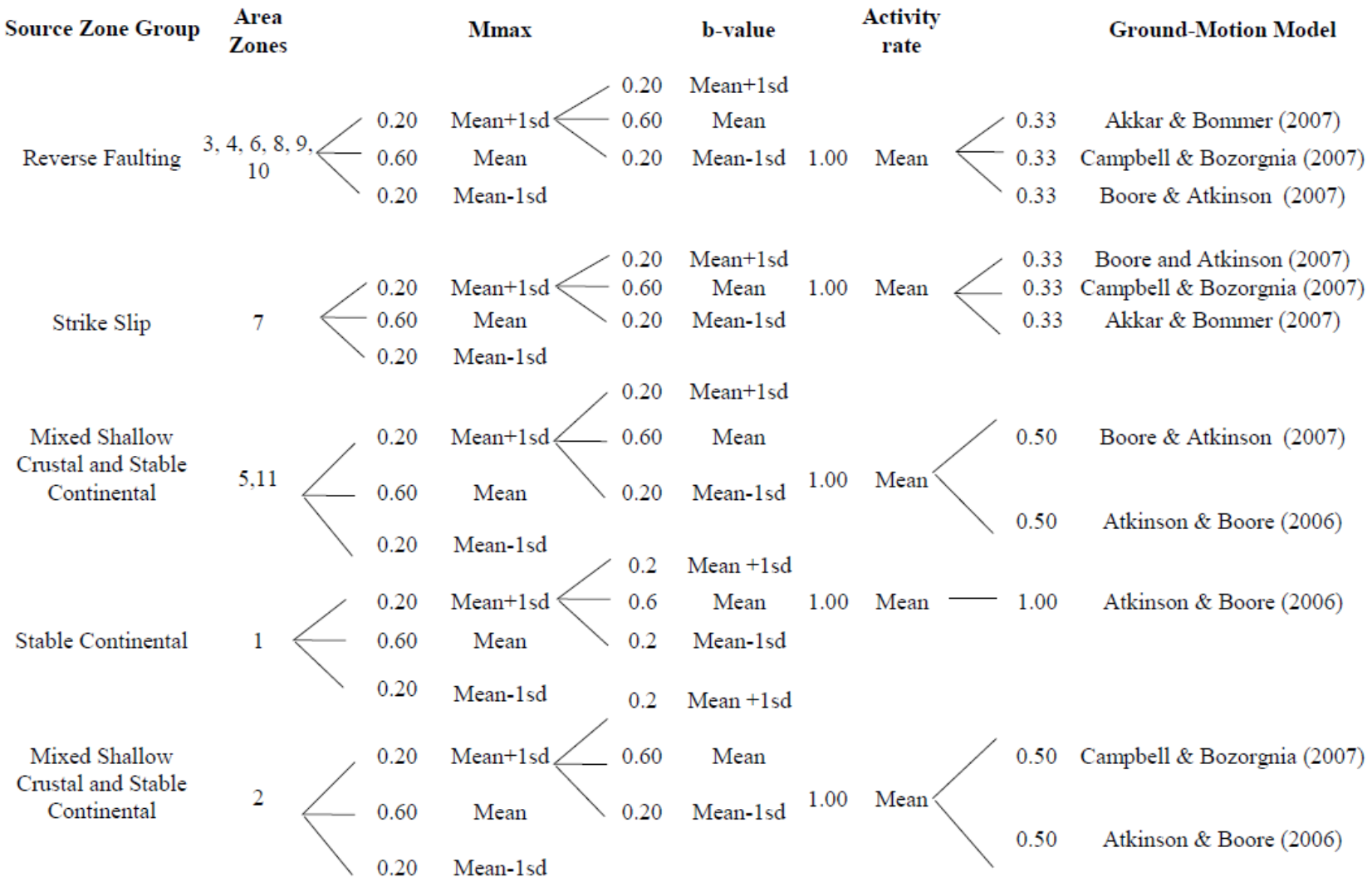
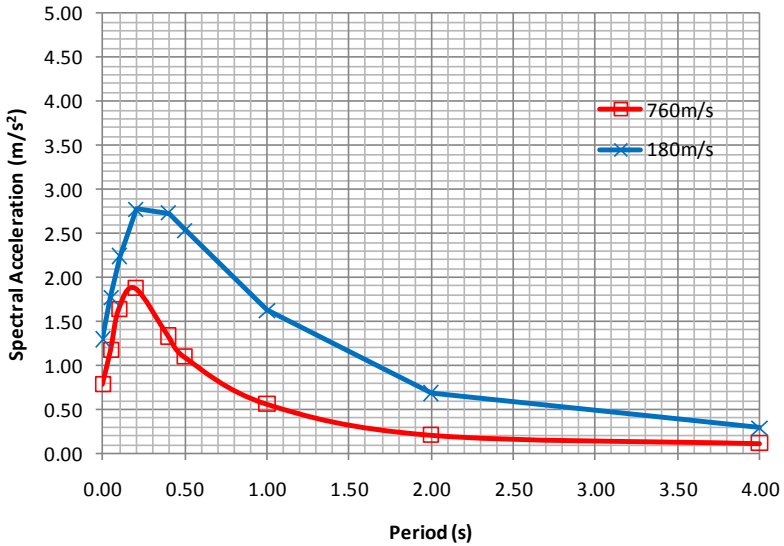
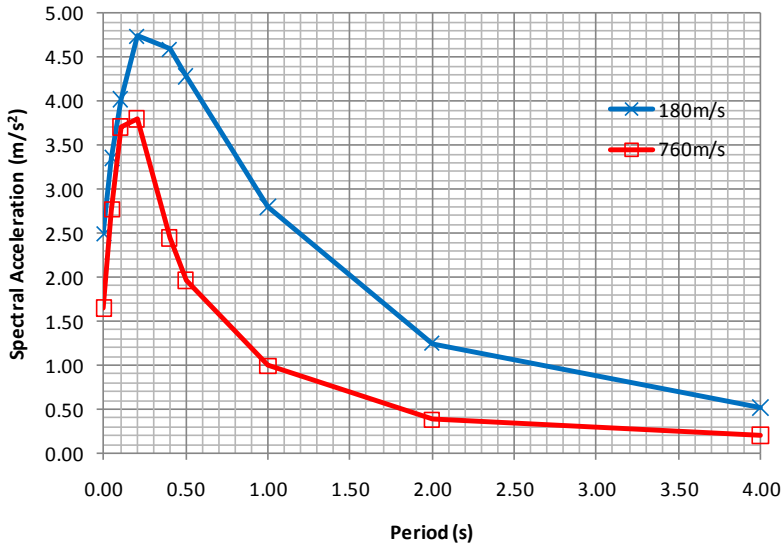


Figure 29 Logic Tree

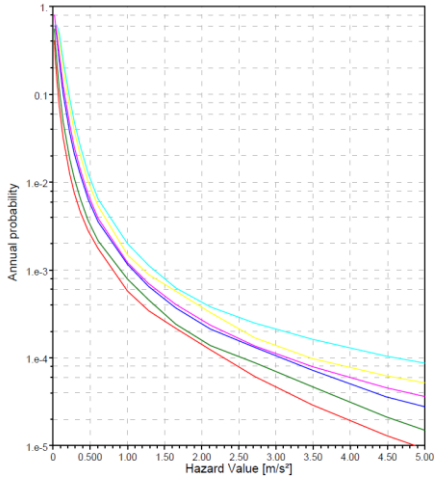


(a) 475-year return period

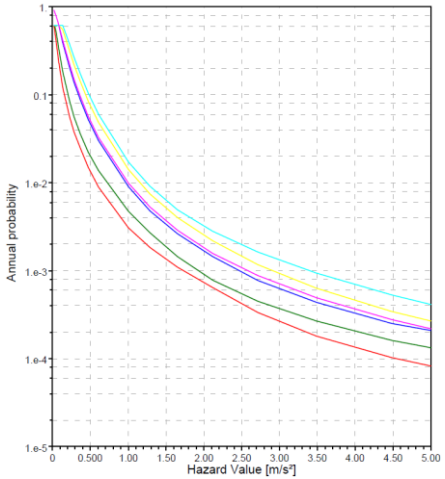


(b) 2,475-year return period

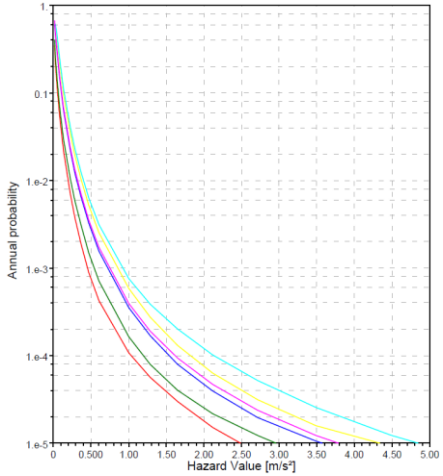
Figure 30 Horizontal Uniform Hazard Response Spectra for different soil conditions at 5% damping



(a) PGA



(b) 0.2-seconds



(c) 1-second

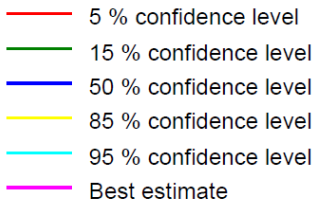
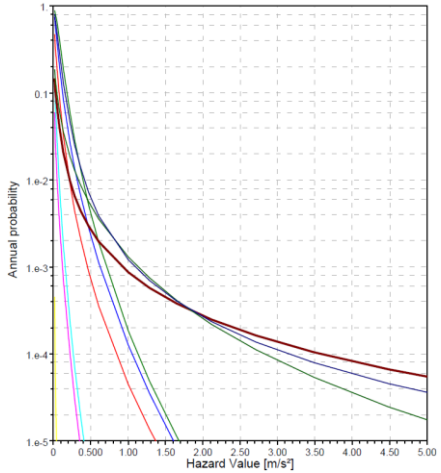
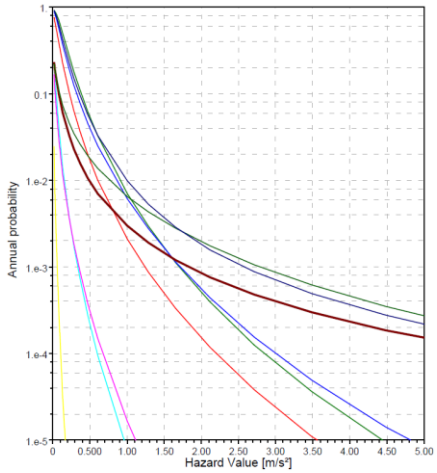


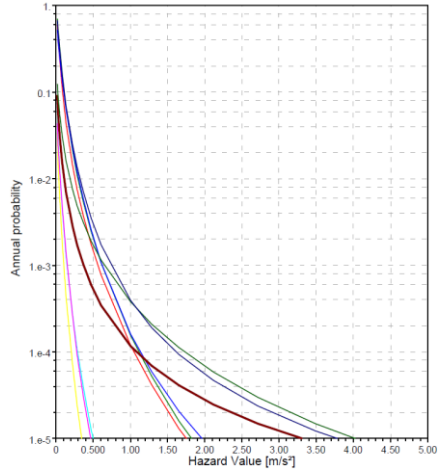
Figure 31 Confidence Levels



(a) PGA



(b) 0.2-seconds



(c) 1-second

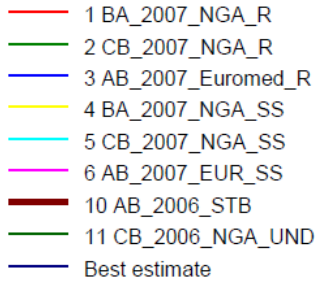
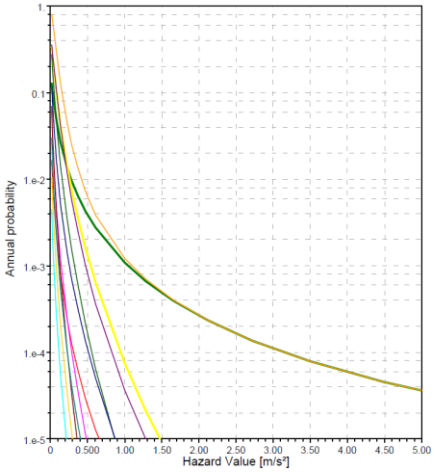
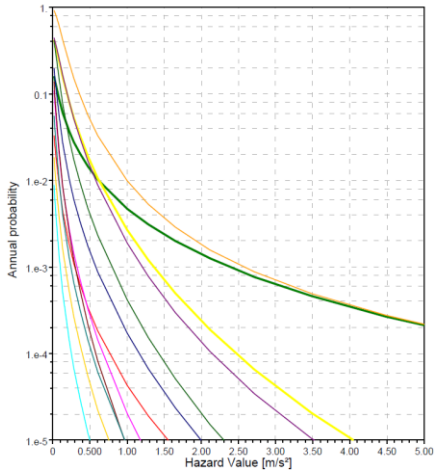


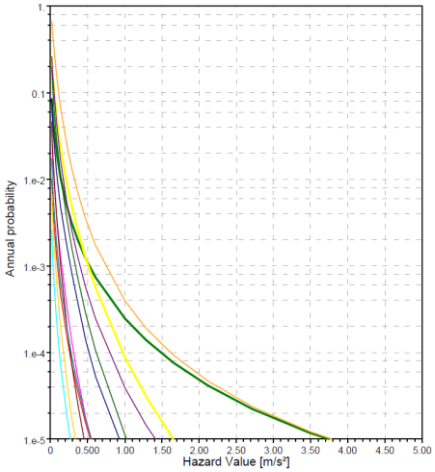
Figure 32 Effect of Attenuation equations



(a) PGA



(b) 0.2-seconds



(c) 1-second

Figure 33 Effect of Source Zones

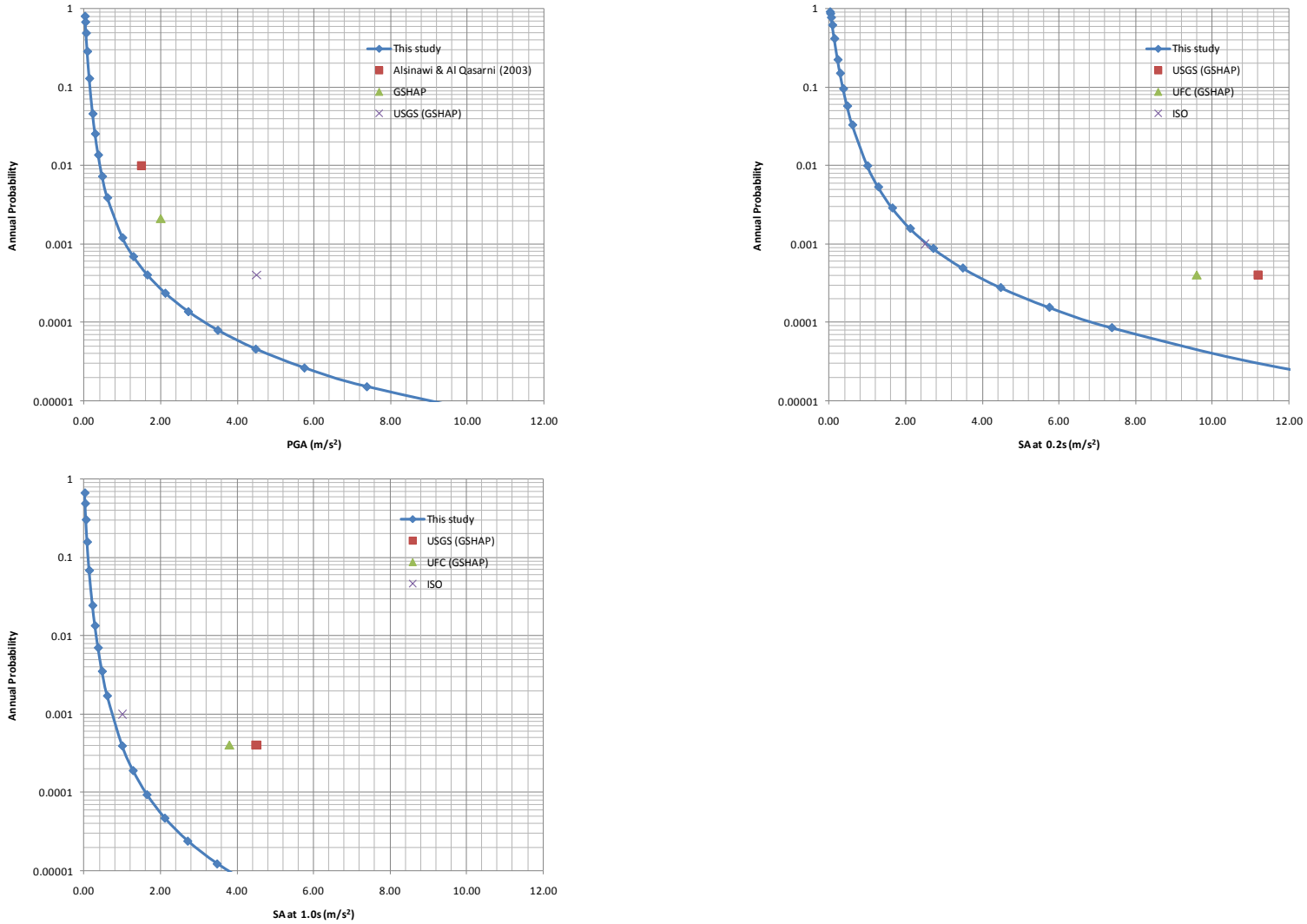
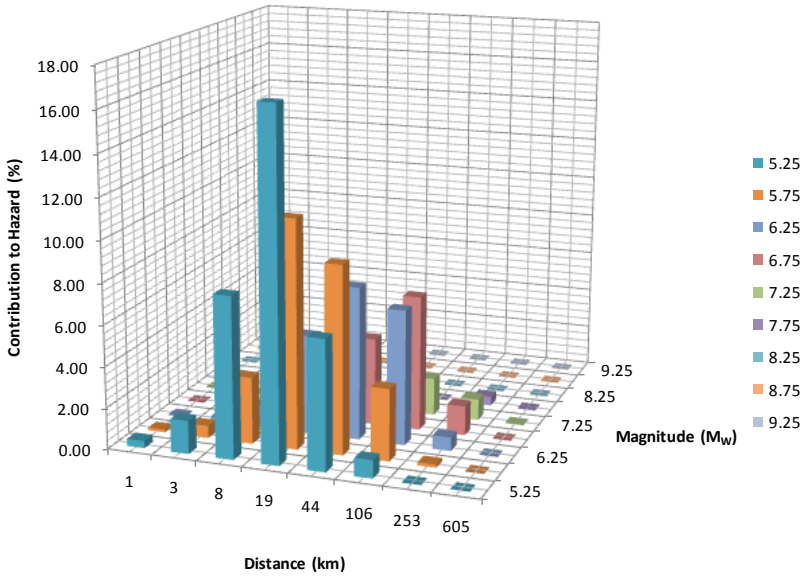
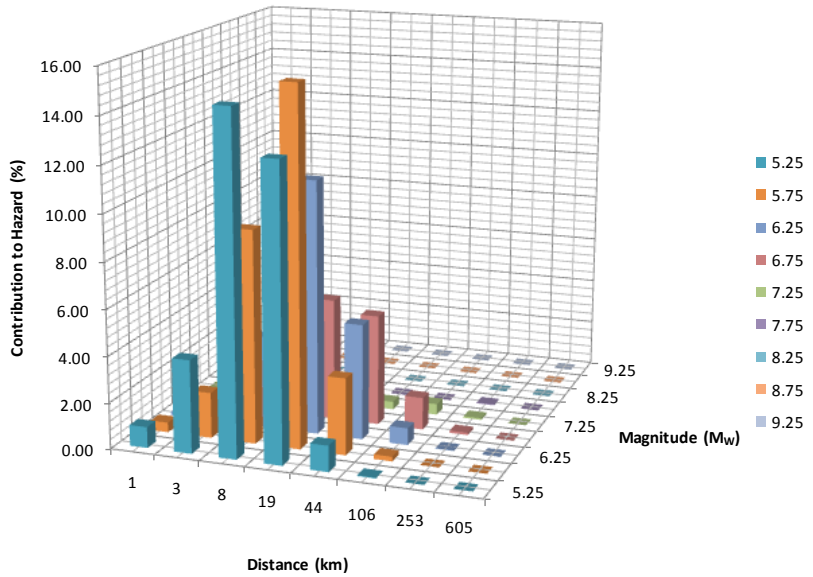


Figure 34 Comparison of this study's results with other studies reviewed

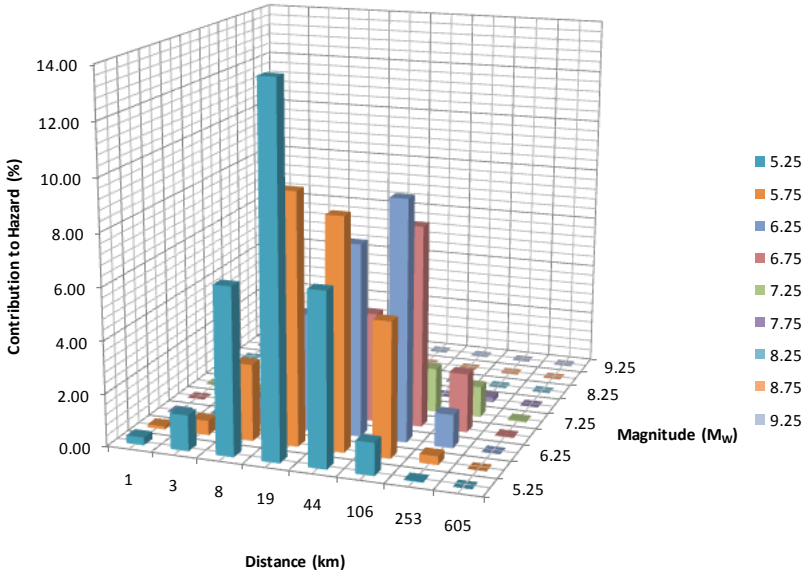


(a) 475 year return period

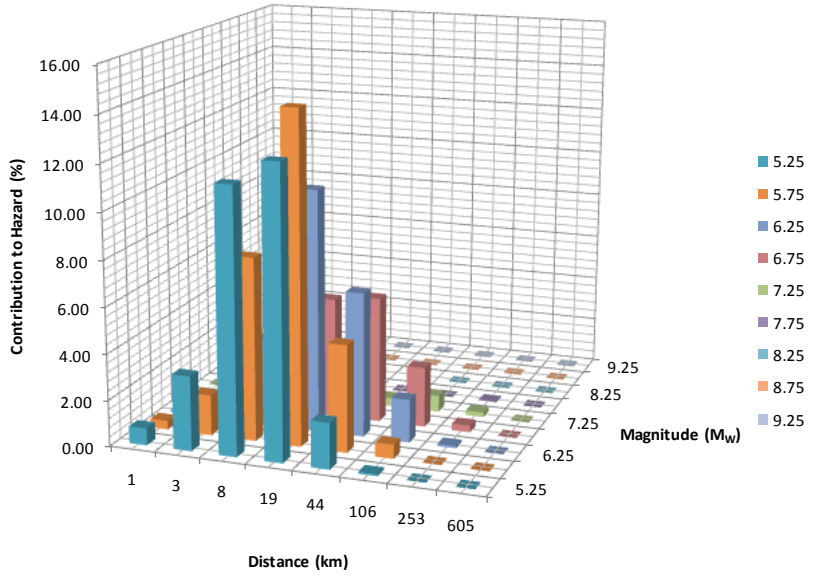


(b) 2475 year return period

Figure 35 De-aggregated Results at PGA

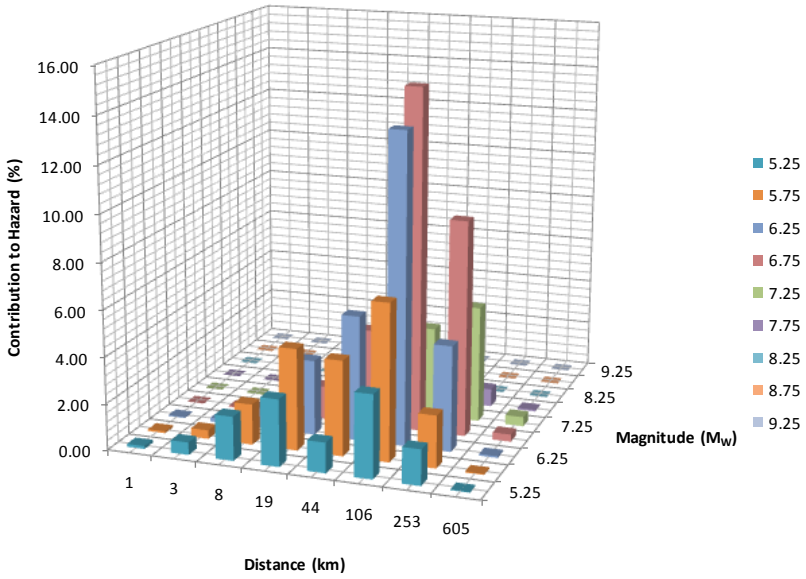


(a) 475 year return period

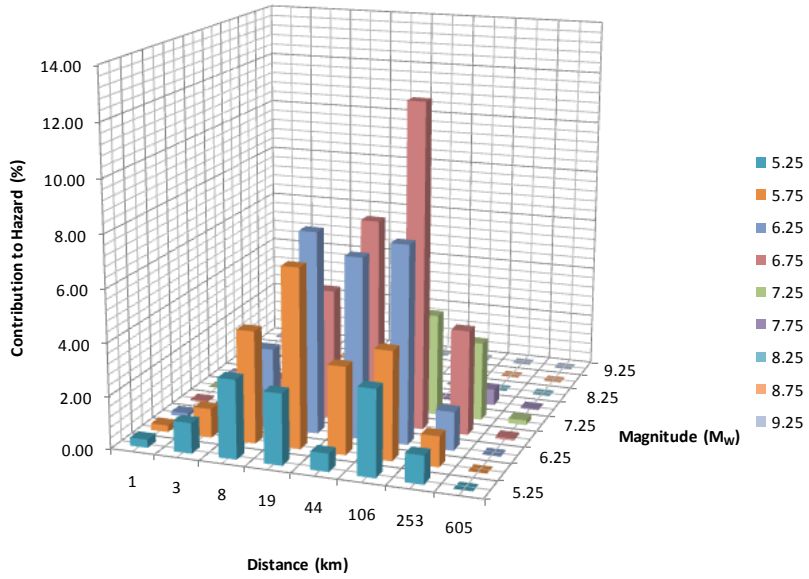


(b) 2475- year return period

Figure 36 De-aggregated Results at 0.2 seconds

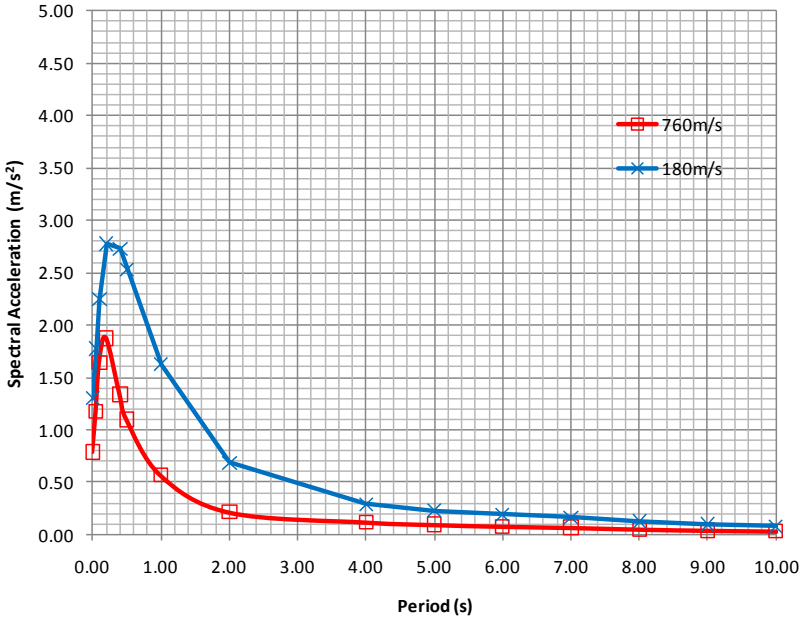


(a) 475 year return period

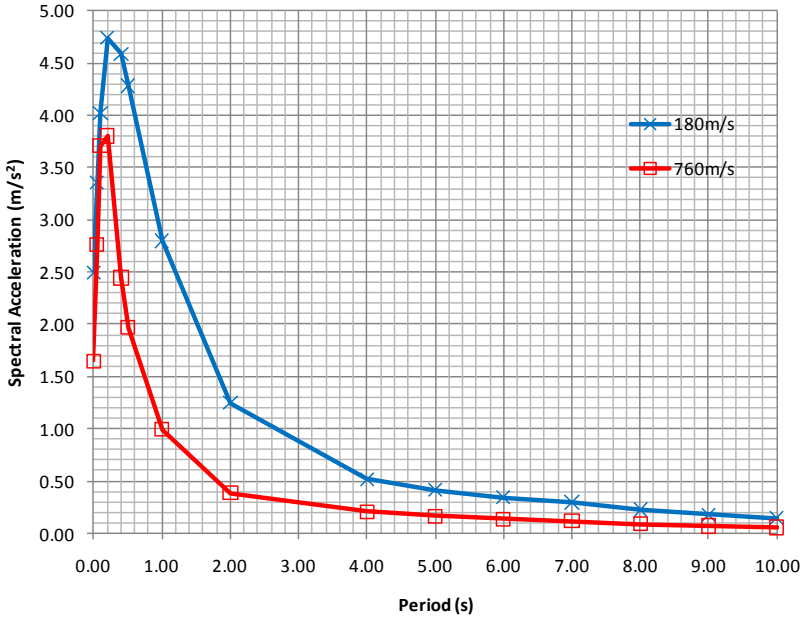


(b) 2475 year return period

Figure 37 De-aggregated Results at 1 second



(a) 475 year return period



(b) 2475- year return period

Figure 38 Horizontal Uniform Hazard Response Spectra extended to long periods for different soil conditions at 5% damping

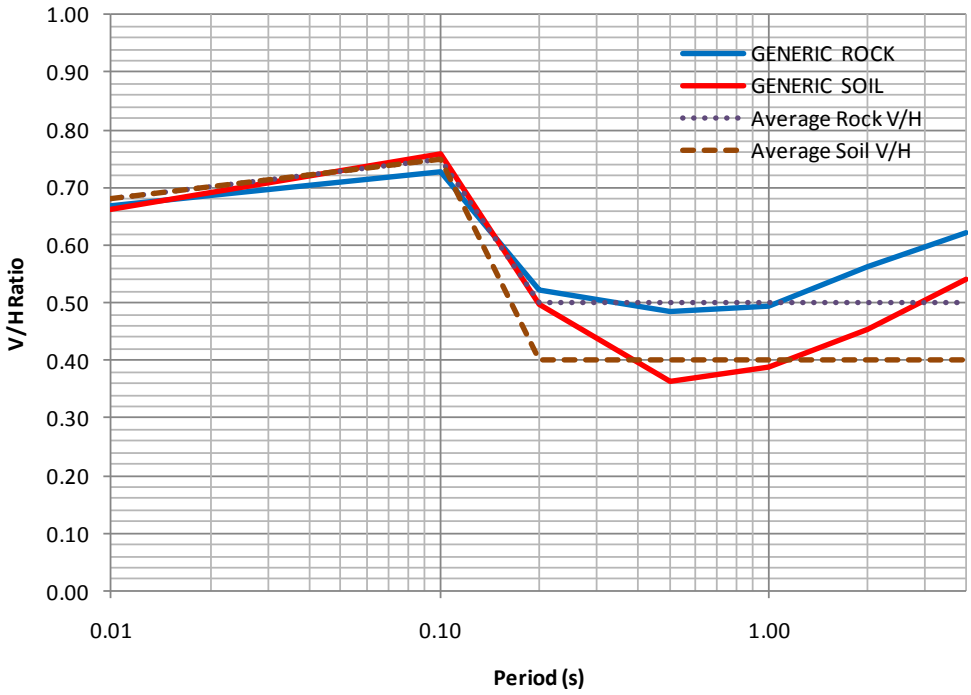
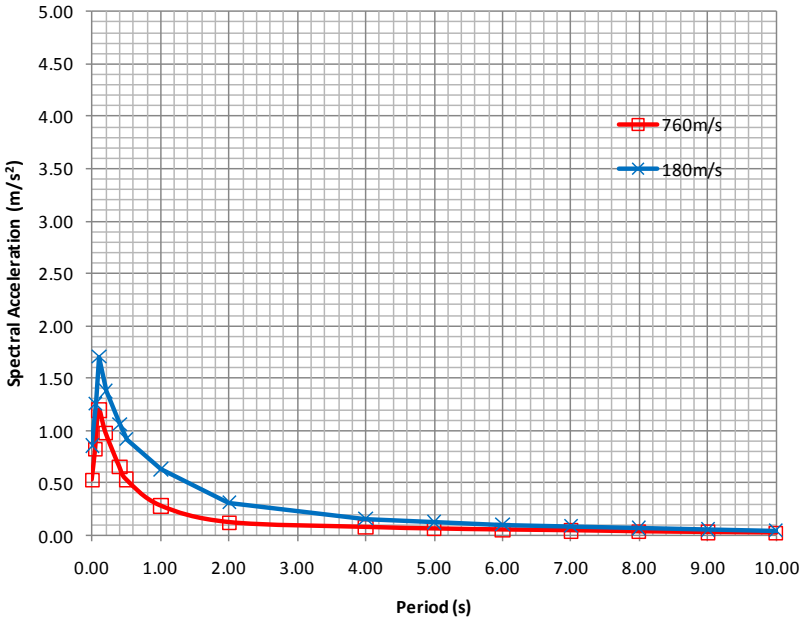
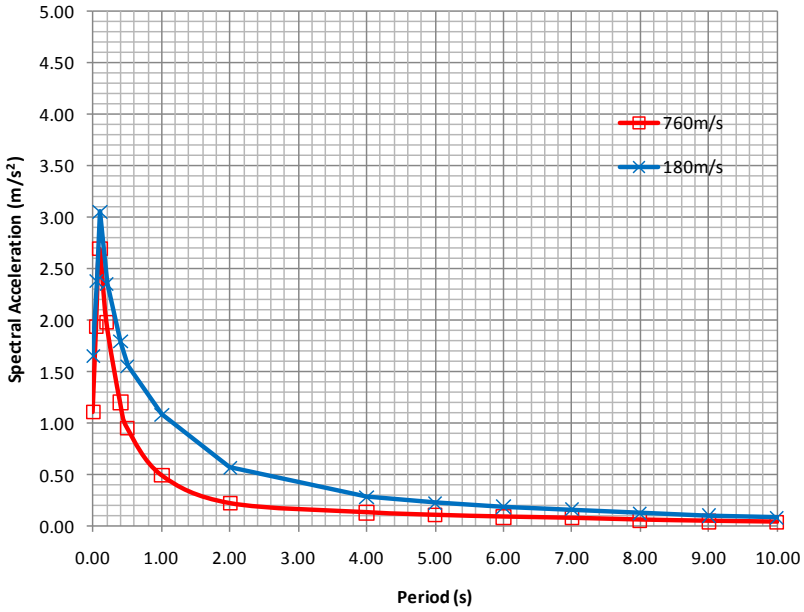


Figure 39 V/H Ratios estimated for earthquakes of Mw ≥ 5.75 at 19 km from the Majnoon site, using the Bozorgnia & Campbell (2004) relationships

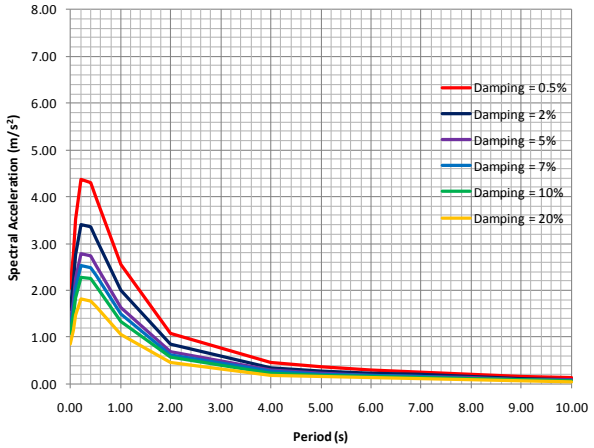


(a) 475 year return period

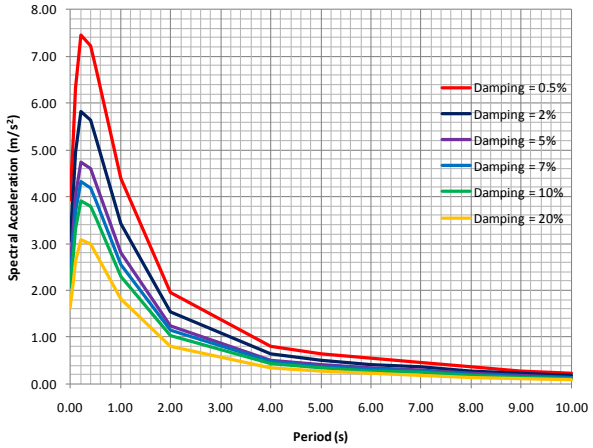


(b) 2475 year return period

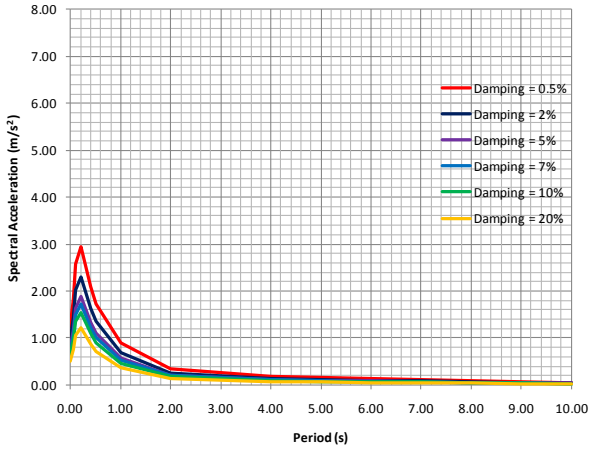
Figure 40 Vertical Response Spectra based on Horizontal UHRS and Bozorgnia & Campbell's (2004) V/H Ratios for different soil conditions at 5% damping



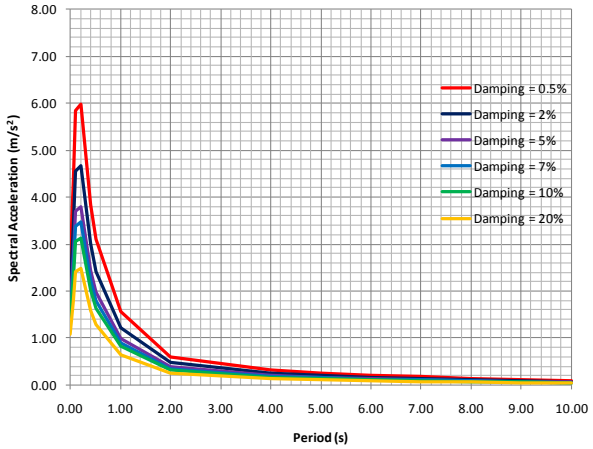
RP = 475 years; Vs = 180m/s



RP = 2475 years; Vs = 180m/s

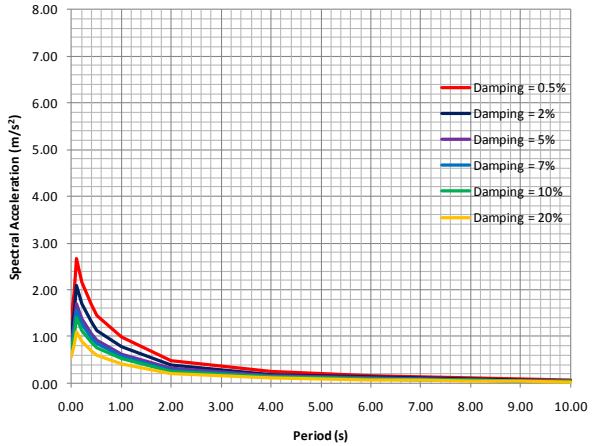


RP = 475 years; Vs = 760m/s

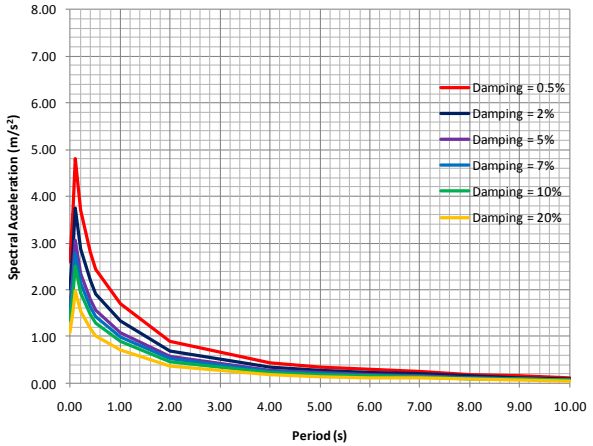


RP = 2475 years; Vs = 760m/s

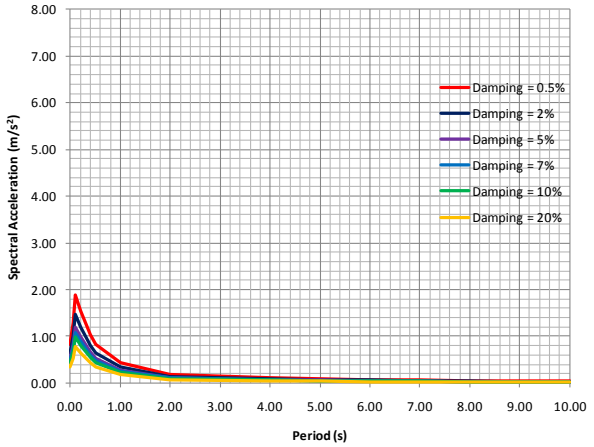
Figure 41 Horizontal UHRS presented at multiple damping levels



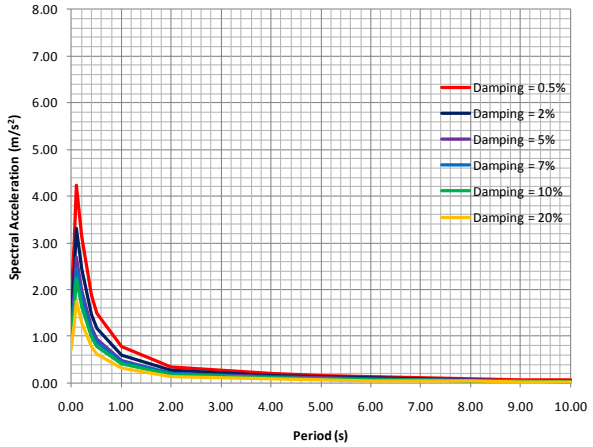
RP = 475 years; Vs = 180m/s



RP = 2475 years; Vs = 180m/s



(c) RP = 475 years; Vs = 760m/s



(d) RP = 2475 years; Vs = 760m/s

Figure 42 Vertical UHRS presented at multiple damping levels

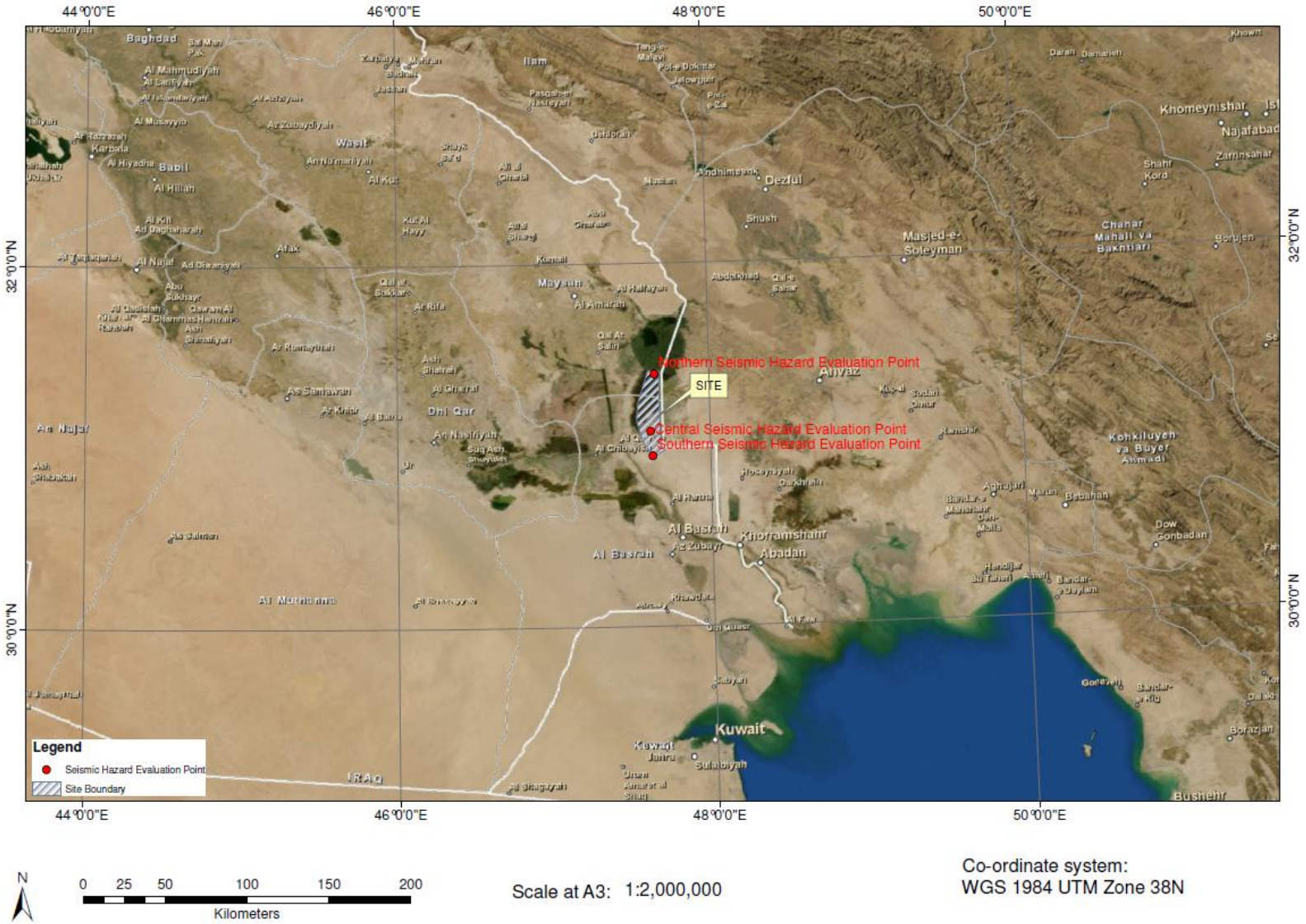


Figure 43 Seismic Hazard Evaluation Points

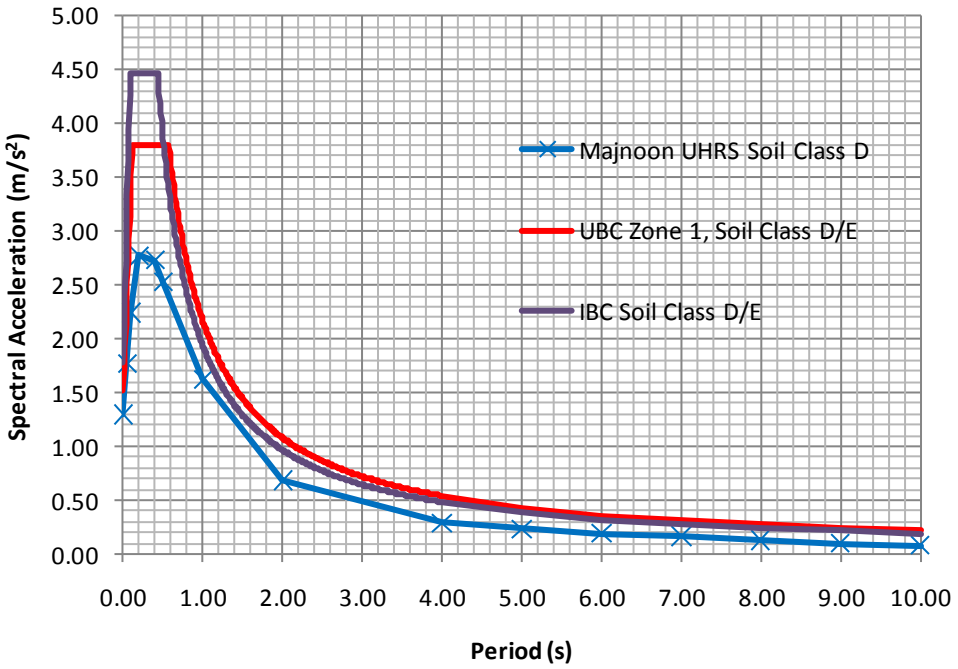


Figure 44 Arup's Probabilistic Seismic Hazard Assessment (PSHA) defined Horizontal Uniform Hazard Response Spectrum (UHRS) for 475 year return period and Soil Class D/E, Uniform Building Code (UBC) defined Spectrum for Zone 1 and Soil Class D/E at 5% damping and International Building Code (IBC) defined spectrum for Soil class D/E at 5% damping.

Appendix A

Geology & Tectonics

A1 Tectonic Setting

It is now well established that the earth's surface crust is divided into a number of large intact plates and that these plates move respect to each other (Fowler, 1990). The earth's crust is divided into six continental-sized (African, American, Antarctic, Australia-Indian, Eurasian and Pacific), about fourteen sub-continental size plates and many micro-plates. Boundaries between the plates are of four principal types: divergent zones; subduction zones; collision zones; and transform faults. The majority of the earthquakes, volcanic and mountain building activity around the world are associated with these plate boundaries.

Figure A1 contains a summary of the geological time periods referred to in this section.

A1.1 General Tectonic Setting

This section on the general tectonic setting of the Arabian Plate is based principally on the work of Reilinger *et al.* (2006), Jassim and Goff (2006), and Jassim and Buday (2006a).

The tectonic setting of the Arabian Plate is shown in Figure A2. The Arabian Plate is bounded by the spreading ridges of the Red Sea and the Gulf of Aden in the west and south; the Levant (or Dead Sea) left-lateral strike slip fault in the north-west; the Masirah fault zone in Oman in the south-east; and the Taurus-Zagros Main Suture compressional boundary in the north and north-east.

The majority of the Arabian Plate itself is designated a stable continental region (Johnston *et al.*, 1994). Stable continental regions are defined as regions of continental crust that have not experienced any major tectonic behaviour, magmatic anomalies, basement metamorphism or anorogenic intrusion since the early Cretaceous (146 to 100Ma), and no rifting or major extension or transtension since the Paleogene (65 to 25Ma).

The tectonic regime of the Arabian Peninsula is dominated by the continental collision of the Arabian and the Eurasian plates, which occurs in a north-north-western direction (Figure A3 and Figure A4).

Figure A5 presents the plate interaction between Arabia, Africa and Eurasia. Iraq is located on the boundary between the Arabian sub-continental plate and the Eurasian Plate. Arabia is shown to be separating from Africa at a rate of approximately 15 to 20 mm/year. The separation is due to the opening of the Red Sea and the Gulf of Aden with Arabia rotating anticlockwise toward the north-northeast. In addition Africa is moving north relative to Eurasia at a rate of approximately 10mm/year. The combined rate of Arabia-Eurasia convergence is approximately 30-40 mm/year. The total convergence over the last 25 million years is indicated to be 100 km with the resulting deformation occurring over a broad zone. This broad deformation zone largely occurs within the national boundaries of Iran and Iraq and forms the Zagros Mountains. This convergence involves intra-continental shortening through Iran and the southern Caucases, and the subduction of the remnants of the Neo-Tethys oceanic basin beneath Eurasian plate in the Makran subduction zone. The Arabia-Eurasia convergence, at a rate of approximately 30-40mm/year, is faster than the Africa-Eurasia convergence that

occurs at a rate of about 10 mm/year. The difference is due to the opening of the Red Sea and the Gulf of Aden with Arabia rotating anticlockwise towards the N-NE.

A1.1.1 Tectonic Patterns of the Zagros Region

The active tectonics of the Zagros Region is described by Berberian (1995), Berberian & Yeats (1999), IIEES (2003), Talebian and Jackson (2004), and McQuarrie (2004).

The Zagros Region comprises an active intra-continental fold-and-thrust belt, trending NW-SE between the Arabian Shelf and Iran, and extending into Iraq. Folding of the Zagros belt commenced in the Miocene, and gets progressively younger from north-east to south-west, suggesting that the deformation front is migrating from the suture (Main Zagros Thrust Fault) towards the Foredeep. Recent folding and uplift of the region is evident in the deep river valleys cutting the folds, raised beaches, and the uplifted alluvial terraces. Uplift rates of 1 to 7mm/year in the Holocene period (10,000 years ago to present) have been reported, along with shortening through folding of up to 30mm/year. The main tectonic units from northeast (top) to southwest (bottom) are:

The *Main Zagros Reverse Fault* is a proposed suture zone between the Arabian Plate (to the SW) and Eurasia. The *Main Recent Fault* is a relatively young, active, right-lateral strike-slip fault, which follows the trace of the *Main Zagros Reverse Fault* from Turkey to approximately 32° S. The High Zagros Thrust Belt has the highest topography and most rapid geomorphological incision rates in the region. Peaks reach heights of 4000m, and gorges reveal deep exposures into the cores of thrusted anticlines. Crustal shortening is believed to have taken place in the High Zagros in the Late Cretaceous (99.5 to 65.6 million years ago) subduction, and the Miocene-Pliocene (23 to 2.59 million years ago) continental collision. The belt is strongly dissected by numerous reverse faults, and is upthrusted to the southwest along different segments of the *High Zagros Fault* (HZF); which separates the High Zagros Thrust Belt from the Simple Folded Belt to the southwest.

The Simple Folded Belt contains NW-SE trending large elongated anticlines, penetrated by salt plugs from the Palaeozoic (543 to 248 million years ago) Hormoz Salt. The belt was folded during the Miocene-Pliocene continental collision. The belt is broadly bounded by the High Zagros Fault to the northeast, and by the Mountain Front Fault (MFF) to the south west. The MFF is a segmented blind thrust fault, which separates the Simple Folded Belt (with exposures of Mesozoic (248 to 65 million years ago) and Eocene-Oligocene (54.8 to 23.8 million years ago) rocks) and the Zagros Foredeep (where a thick sequence of Miocene evaporites outcrops). Large amounts of detrital material were provided to be deposited in the Zagros Foredeep southwest of the MFF, through erosion of the uplifting High Zagros Thrust Belt and Simple Folded Belt.

The Zagros Foredeep, bounded to the northeast by the MFF and to the southwest by the Zagros Foredeep Fault (ZFF). The Zagros Foredeep Fault is a segmented reverse-slip system which, although predominantly blind, does have a surface expression to the southwest of the Dezful Embayment, in the form of segments of thrust faults cutting the inverted limbs of anticlines. The formation of the Zagros Foredeep is associated with motion along the MFF and uplift of the Simple Fold

Belt, and largely consists of elongate, symmetrical folds. The anticlines associated with the Zagros Foredeep are still growing, and the evidence from continuous unconformities in the Pliocene freshwater sediments and recent folded gravels show they have been active since the Pliocene.

The Zagros Coastal Plain, Mesopotamian Basin and Persian (Arabian) Gulf are bounded to the northeast by the Zagros Foredeep Fault, and to the southwest by the Euphrates Boundary Fault, a deep-seated tectonic feature in Iraq comprising a series of faults associated with grabens (which probably influenced the evolution of the Mesopotamian Basin), and which is taken to form the boundary between the Quaternary Mesopotamian Basin and the rocky desert of southeast Iraq. The Majnoon site is wholly situated in the Mesopotamian Basin, i.e. outside the area of active deformation of the Zagros.

The active deformation in the Zagros Region is thought to be dominated by the following features:

- Prevalent subsurface blind thrusting
- Occasional surface strike-slip faulting
- Coseismic asymmetric folding and uplift of sedimentary cover, and
- Surface thrusting ramping up from at least two regional decollement detachments

A number of these features are evident in the cross-section shown in Figure A7.

The style of faulting changes appreciably along the length of the Zagros belt. In the southeast, the convergence of the tectonic plates is largely orthogonal to the strike of the Zagros, and is thus achieved predominantly by thrusting. In the northwest, by contrast, the overall convergence is oblique to the strike of the belt; this leads to a separation of the orthogonal strike-slip and thrusting (shortening) components on separate (transform and thrust respectively) fault systems.

Reliable fault plane solutions and focal depths of earthquakes in the Zagros show that most earthquakes occur on high-angle thrust faults, dipping 40-50° to the south and southwest, at centroid depths of 5-15 km in the uppermost part of the basement rocks beneath the younger sedimentary cover rocks. The interface between the basement and the younger sedimentary cover is marked by the Hormuz Salt layer. No fault plane solutions indicate seismic slip along a detachment surface between the basement and the sedimentary cover suggesting that slip on this surface is not seismic. The faults in the basement are therefore “blind”, i.e. there is no surface rupture, although they may partially control the development of surface folds.

A1.2 Tectonic Setting of Iraq

The tectonic setting of Iraq is discussed in Jassim and Goff (2006), Jassim and Buday (2006a), Aqrawi *et al.* (2010). This section will briefly present the palaeostructural elements of Iraq (i.e. tectonic features created through processes in the Precambrian), and then discuss the features that the more recent tectonic evolution of the region has produced.

A1.2.1 Palaeostructural elements in Iraq

A number of palaostructural (i.e. originating in the Precambrian era, 4500 to 543 million years ago) elements (structures, lineaments and faults) have been recognised in Iraq on the basis of geophysical (gravity and magnetic) data. The fault systems are the NW-SE trending Najd Fault System, the NE-SW trending Transversal Fault System, and the north-south trending Nabitah Fault System (Figure A7). These fault systems were reactivated at different times during the Phanerozoic (543 million years ago to present), controlling the distribution of structural highs and lows, which influenced subsequent deposition and the distribution of sedimentological facies. The examination of interpreted seismic profiles and observed seismicity, however, suggests that those elements of these fault systems in Mesopotamian Basin, and in the vicinity of the site in particular, largely ceased being active in the Cenozoic (65 million years ago to present). The reactivation and seismogenic potential of these palaeo-faults as relates to the area under investigation is thus considered negligible, and they are not considered as discreet seismogenic zones in this study.

A1.2.2 Phanerozoic tectonic features

The Arabian Plate can be divided into the Arabian Shield and the Arabian Shelf. The Arabian Shield is an area of Precambrian outcrops which was uplifted and exposed for much of Phanerozoic time. The Arabian Shelf forms an eastward-deepening Phanerozoic basin which contains up to 14km of sediment. The Arabian Shelf in Iraq can be divided into an unfolded area (or stable shelf) and a folded zone (or unstable shelf). These two areas can be further sub-divided into five tectono-physiographic zones; these zones are characterised by varying degrees of Neogene structural deformation and associated topographic expression, and are generally bounded by major faults which represent deep-seated structural elements. These zones, described below, are broadly oriented in a NW-SE direction (Figure A8).

A1.2.2.1 Zones of the Unstable Shelf

- The **Thrust Zone**, is the High Zagros Thrust Belt discussed in Section A1.1.1, forming a narrow belt along the NE border of Iraq. This zone contains highly folded and faulted Palaezoic and Lower Mesozoic rocks, and was subjected to orogenic movements in the Late Triassic, Upper Cretaceous, and the Neogene.
- The **Folded Zone**, is the Simple Folded Belt discussed in Section A1.1.1, comprising mountainous areas in the north and NE of Iraq. The zone is typically 200km wide, and is characterised by overlapping and faulted folds formed by Zagros deformation during the late Cenozoic.
- The **Mesopotamian Basin**, part of the Zagros Coastal Plain, Mesopotamian Basin and Persian Gulf zone discussed in Section A1.1.1, consisting of the flat, broad plains of the Tigris-Euphrates river system. As the site is situated in the Mesopotamian Basin, this zone is examined in greater detail below.

A1.2.2.2 Zones of the Stable Shelf

- The **Salman Zone**, a palaeohigh with shallow basement, forming the eastern part of the Stable Shelf (Zone 4, Figure A9).

- The **Rutbah-Jezira Zone**, a Palaeozoic Basin in western Iraq (Zone 5, Figure A9).

A1.2.2.3 The Mesopotamian Basin

The Mesopotamian Basin forms a broad, flat-lying area located between Central Iraq and Kuwait, and is covered by loess and Quaternary fluvial-plain deposits of the Tigris-Euphrates river system.

The basin is an asymmetric foredeep with a regional dip to the east and northeast. The Upper Jurassic surface, taken to denote the base of the basin, lies at 2000-3500mbgl in the west, deepening to more than 6000mbgl in the east and northeast. The western margin of the basin is interpreted to be bounded by NNW-SSE trending fault zones, the most prominent of which is the 300km long *Abu Jir Lineament* (Figure A9). Interpretation of a regional scale SW-NE seismic profile suggests that the faults of the Abu Jir zone, and other basement lineaments further to the northeast, terminate at the top of the Late Cretaceous, with no obvious signs of reactivation in the Cenozoic for the most part of the Mesopotamian Basin.

Interpretation of a regional scale SW-NE seismic profile (Figure A9) suggests that the faults of the Abu Jir zone, and other basement lineaments further to the northeast, terminate at the top of the Late Cretaceous, with no obvious signs of reactivation in the Cenozoic for the most part of the Mesopotamian Basin. The seismic profile also shows the stratigraphical relationships between the relatively recent (Cenozoic) sediment infill of the basin; the thick Mesozoic succession where the basin was developed; the deep-seated Palaeozoic basement.

A1.2.2.4 Structural Cross-Sections

As cross-sections 1 to 3 (Figure A11 to Figure A13) show, a thick sequence of Cretaceous to Recent sediments has accumulated in the Mesopotamian Basin. Anticlines and horsts, thought to be related to long-lived palaeostructures, lie beneath undeformed or gently deformed Neogene cover.

Section 1 (Figure A11), located approximately 60km to the south of the site, shows a number of anticlines lying beneath undeformed or gently deformed Neogene material. These features may be related to paleo-faults in the basement, which are here shown to reach the base of the Upper Permian. In the southern part of the Mesopotamian Basin, there fold features may also be related to movement (diaparism) of Cambrian Hormuz Salt. These gentle folds are probably not related to the more recent Zagros orogeny[2] (as they do not seem to affect the orogeny's contemporaneous Neogene sediments), and are thus taken to be the product of an earlier compressional stage, or possibly salt diapirism. The sediment pile in the southern end of the Mesopotamian Basin, which cross-section 1 transects, is relatively thin, with circa 11 km of sediments, out of which approximately 1 km was deposited in the Neogene period.

Section 2 (Figure A12), located approximately 100 km northwest of the site, shows a number of blind (i.e. without surface expression) faults in the north-eastern extreme of the section. These thrust faults represent blind segments of the Zagros Foredeep Fault zone, which lies, at its closest point, approximately 120 km

[2] *Oregeny* - creation of mountains through tectonic movement

northeast of the site (see Figure A4). Although the Zagros Foredeep Fault does penetrate the Neogene sediments of the Mesopotamian Basin (a result of its assumed Miocene age), it is largely without surface expression, as presumably the rate of sediment deposition is in this case faster than the rates of folding and uplift. The sediment pile increases in thickness compared to Section 1 (see Figure A10), with approximately 13 km of Phanerozoic sediments, with around 4km having been deposited in the Neogene.

Section 3 (Figure A13), located approximately 350 km northwest of the site, shows a major horst structure[3] in the basement and Palaeozoic deposits. The north-eastern fault of this horst is thought to represent the Euphrates Boundary Fault. This section is located in the area of thickest deposition of the Mesopotamian Basin, with a total thickness of 15 km of Phanerozoic sediments, of which 5 km were deposited in the Neogene.

A1.2.3 Active Faulting in Site Location

A1.2.3.1 Definition of Active Faults

The definition of active faults for the purposes of this study is taken from ExxonMobil's Global Practice (GP) on Probabilistic Seismic Hazard Assessment (ExxonMobil 2009); active faults are defined as those faults:

"…exhibiting geological evidence of Quaternary (NB 2.6 million years to the present) displacement or [that are] associated with contemporary seismic activity".

A1.2.3.2 Published data

A study on the geodynamic characteristics of the Arabian-Eurasian and Indian-Eurasian collision region (Trifonov *et al.* 1999) presents a dataset of active faults, defined as faults that have displayed signs of displacement in the last 100,000 years. A number of faults are shown to traverse near the site, mainly in NW-SE and NE-SW directions (see Figure A14). Closer examination of the locations of these faults, however, reveals a close match between them and the basement, pre-Cenozoic faults presented earlier (as shown for example in Figure A8).

In addition, a number of recently published datasets (e.g. structural cross sections from Aqrawi *et al.* [2010], see Figure A11 to Figure A13) suggest that these basement faults do not pierce through the thick Cenozoic sediment pile underlying the site, and thus cannot have been active in the Cenozoic Era (65 million years ago to present).

From the above it follows that the likelihood of these basement faults having been active within the last 100,000 years, and by extension the Quaternary, is low.

[3] *Horst structure* – uplifted block bounded by normal faults

A1.2.4 Occurrence of Active Faults at the Site

The above interpretation and analysis of geological, structural, geomorphological and remote sensing data suggests that the likelihood of occurrence of active faults (defined here as those exhibiting displacement in the Quaternary or associated with contemporary seismic activity) at the site is low.

A2 Geologic Setting

A2.1 Geology of Iraq and the Mesopotamian Basin

The surface geology of Iraq largely reflects its geomorphology, with the youngest sediments (Neogene and Quaternary) occupying the central depression (Mesopotamian Basin), and older strata, up to Palaeozoic age, exposed in the flanks (Figure A15).

The geology of the Mesopotamian Basin is a result of a system of river channels, levees, marshes, sabkha and delta, flanked on both sides by alluvial fans. As a result of the various environments of deposition, there are rapid transitions, both horizontally and vertically, between fluvial, lacustrine (i.e. lake), deltaic and aeolian sediments.

The Mesopotamian Basin is an extensive lowland that covers an area approximately 110,000km2 in central and southern Iraq. It has been, from the Plio-Pleistocene to the present, a subsiding sedimentary basin where thick Quaternary deposits have accumulated. The majority of the sediment load has been transported and deposited by the Tigris-Euphrates river system, although river and wadis emanating from the east and west flanks of the basin also contribute to sediment supply. These streams have also produced alluvial fans on both sides of the basin.

A2.2 Site Geology

The site, located approximately 150km from the Arabian Gulf, has an average elevation of circa 3m above mean sea level (msl). The geology of the site is expected to comprise alluvial sands, silts and clays, marsh sediments, possibly with high organic content, and levees comprising sand and silt. Given the low elevation of the site, and the higher sea levels of the recent past, it is likely that low energy sediments of a brackish environment (e.g. lagoonal laminated silts and clays) may be present at shallow depths. These Quaternary deposits are expected to overlie a complete Mesozoic and Cenozoic section, more than 5km thick.

At the present time, very limited geotechnical data is available for the Majnoon site. However, a review of preliminary data shows that the sediments comprise of variable competence, with rapid vertical and horizontal transitions, as a result of the variable depositional processes. The thickness of the Quaternary alluvial fill is expected to be in the order of 100m (Figure A16). Underlying this layer are expected to be moderately indurated Neogene formations (predominantly clastic sediments with some limestones).

Additionally, the area has known to be a marsh or swamp until recently, and is believed to have been drained in the latter part of the 20th century; therefore, it is likely that the water table will be high.

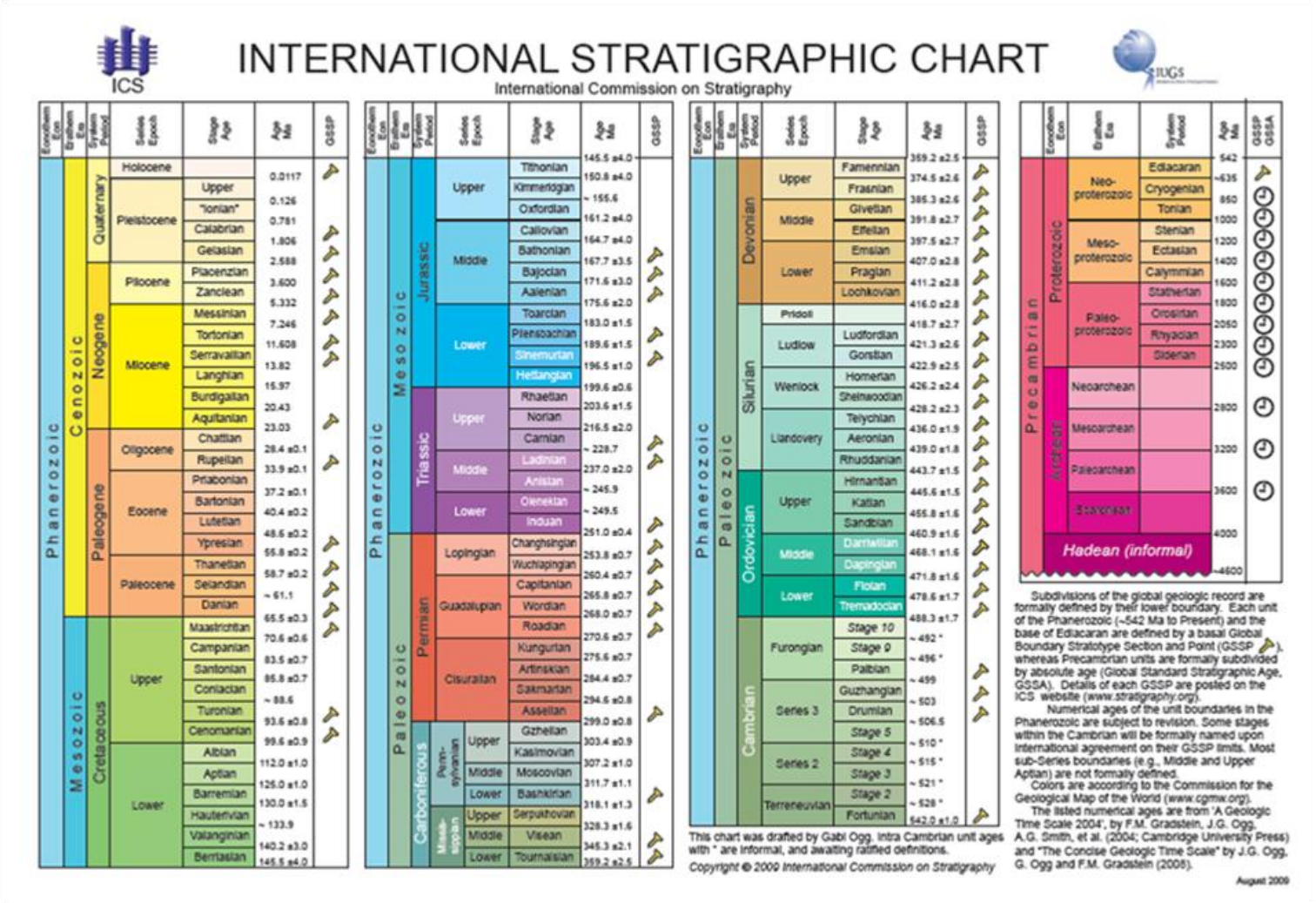


Figure A1: Geological Time Scale Reference Chart

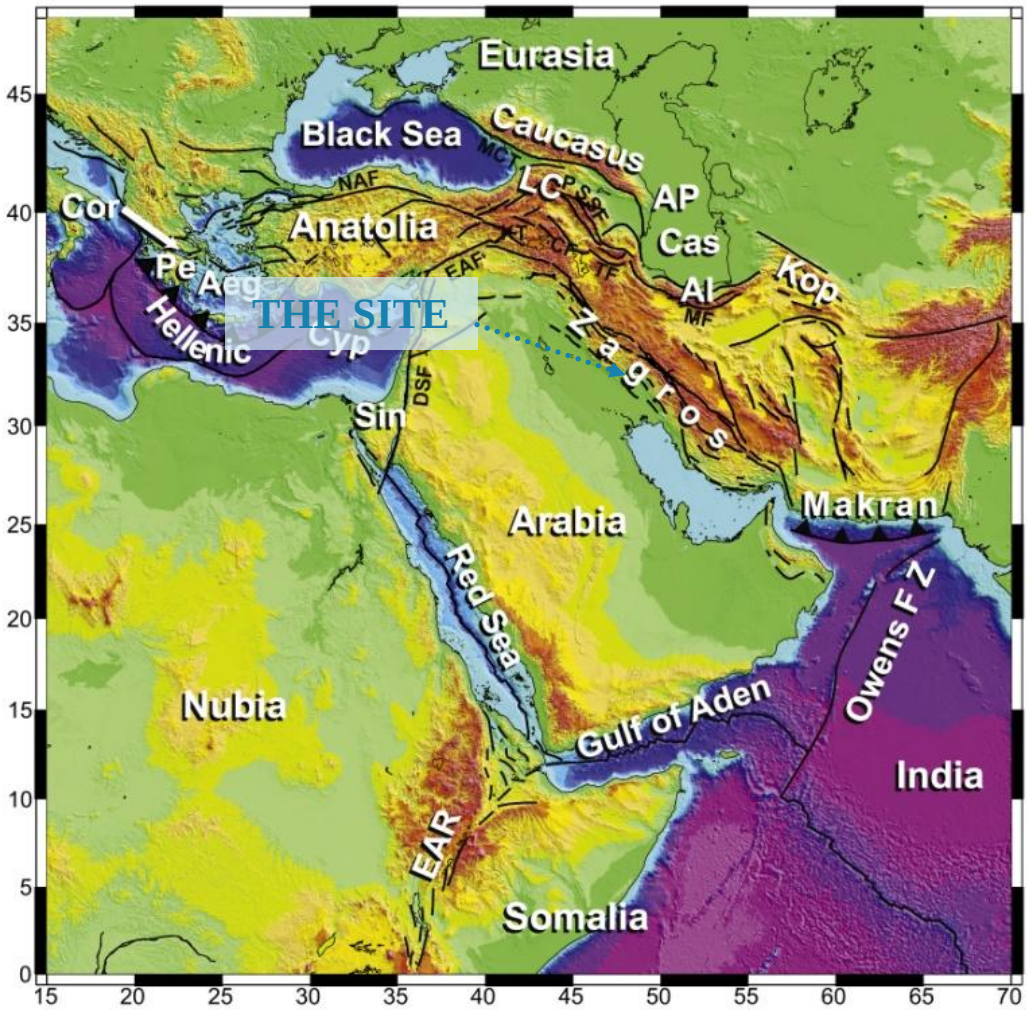


Figure A 2 Topographic and tectonic map of the Arabian Plate and eastern Mediterranean region (Reilinger *et al.* 2004)

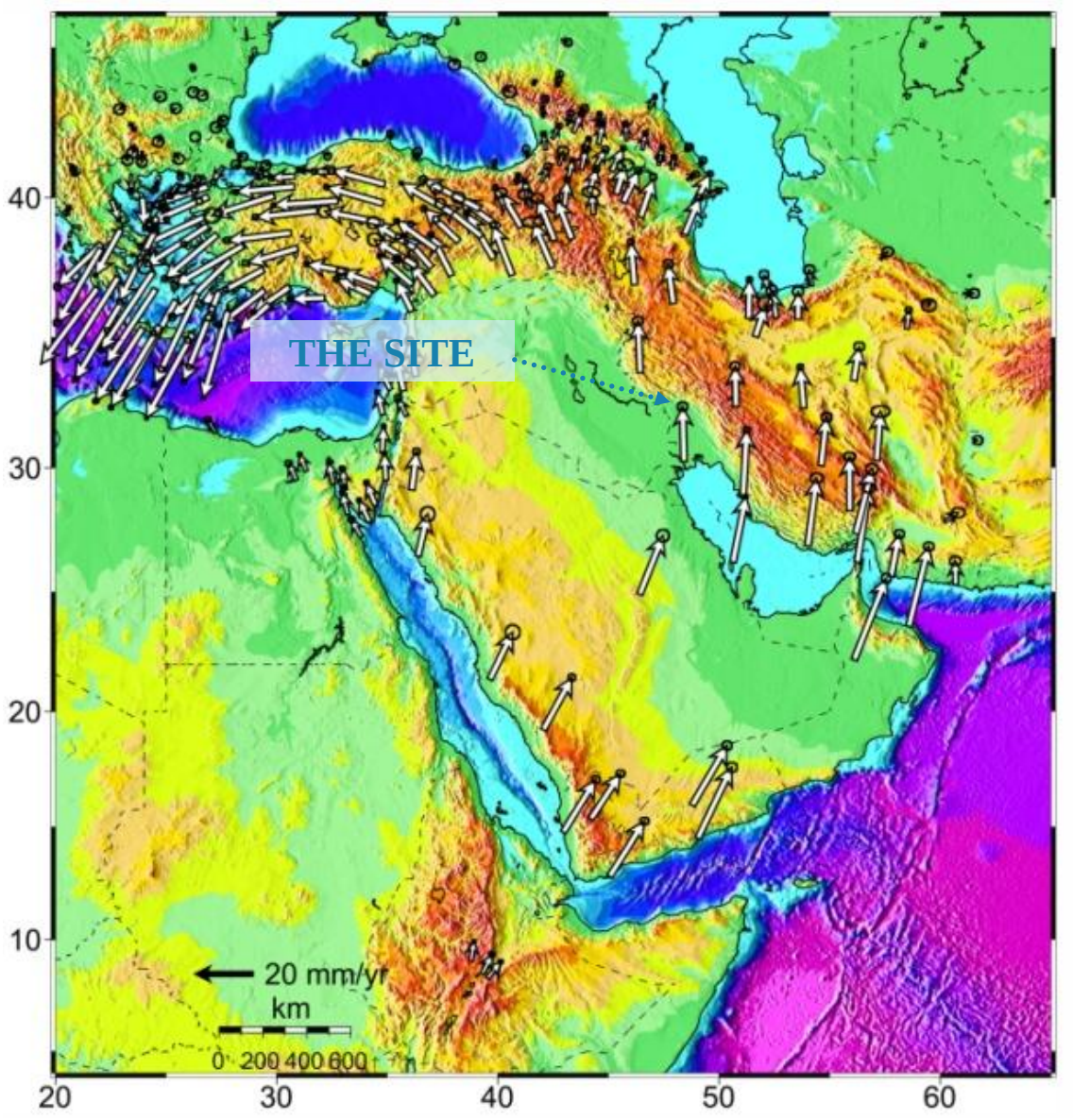


Figure A 3 Global Positioning System (GPS) velocities of the Arabian Plate relative to Eurasia (Reilinger *et al.* 2004)

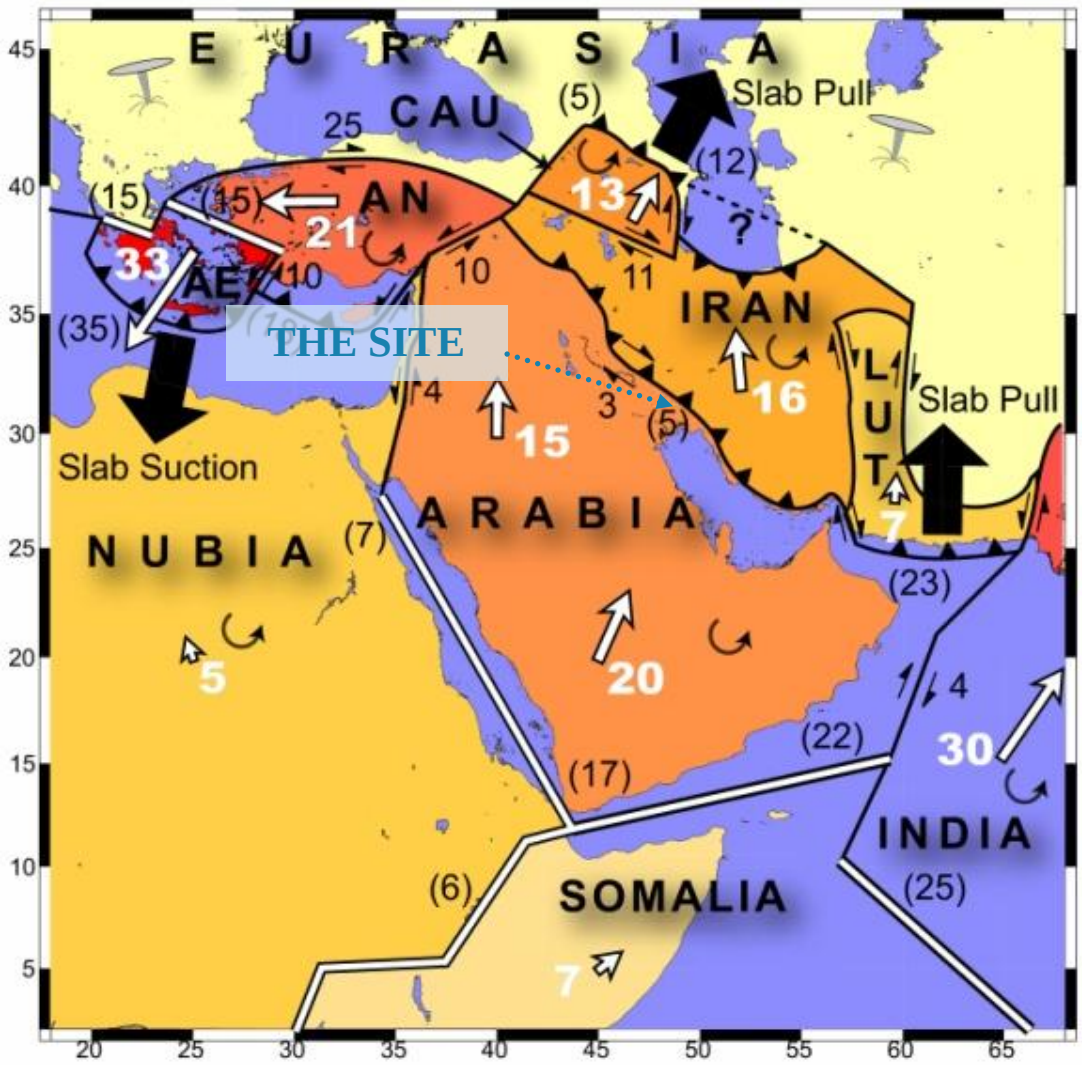


Figure A 4 Plate interaction between Arabia, Africa and Eurasia (Reilinger *et al.* 2004)

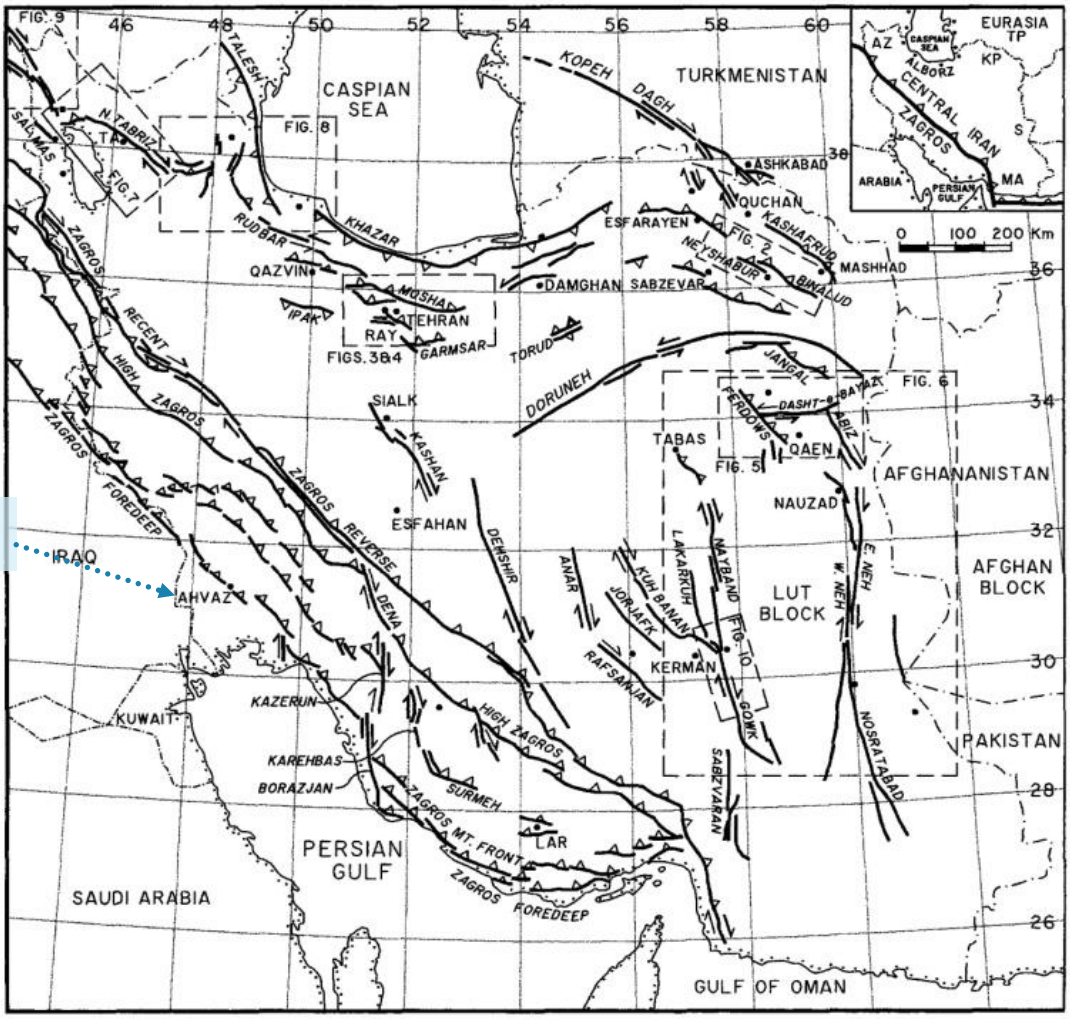


Figure A 5 Active faults of Iran (Berberian, 1995)

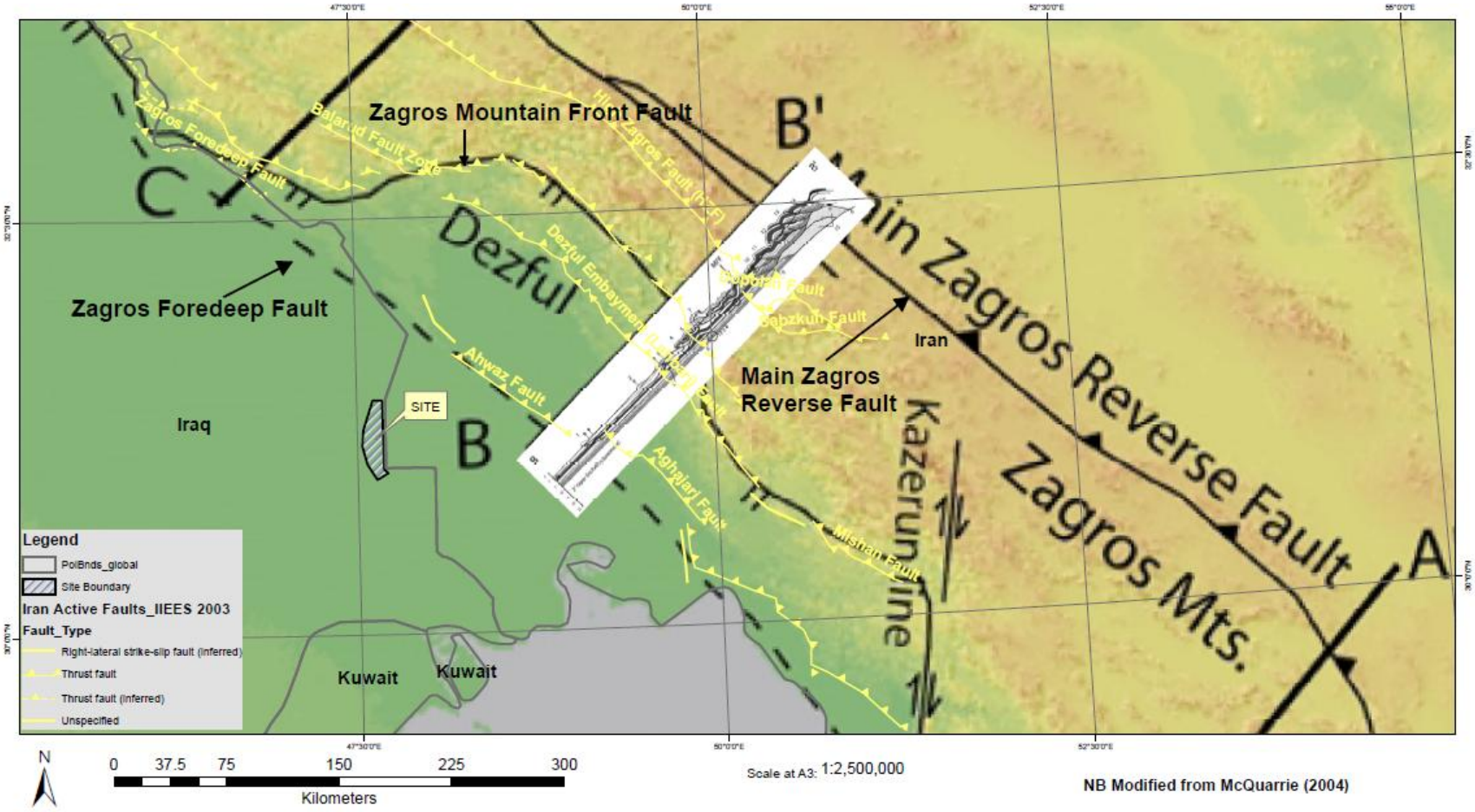


Figure A 6 Location of cross-sections across the Zagros

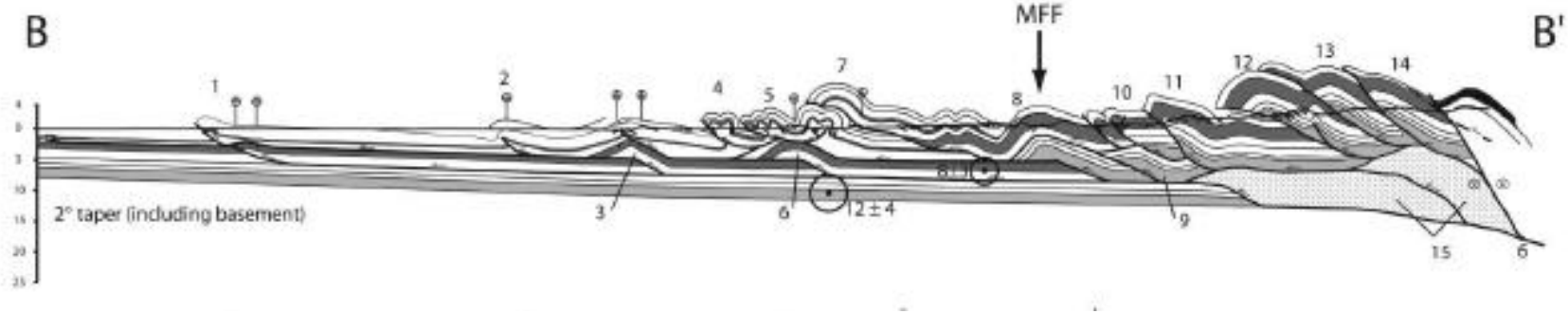


Figure A 7 SW-NE structural cross-section (see Figure A6). Point B is approximately 100km east of the Majnoon site

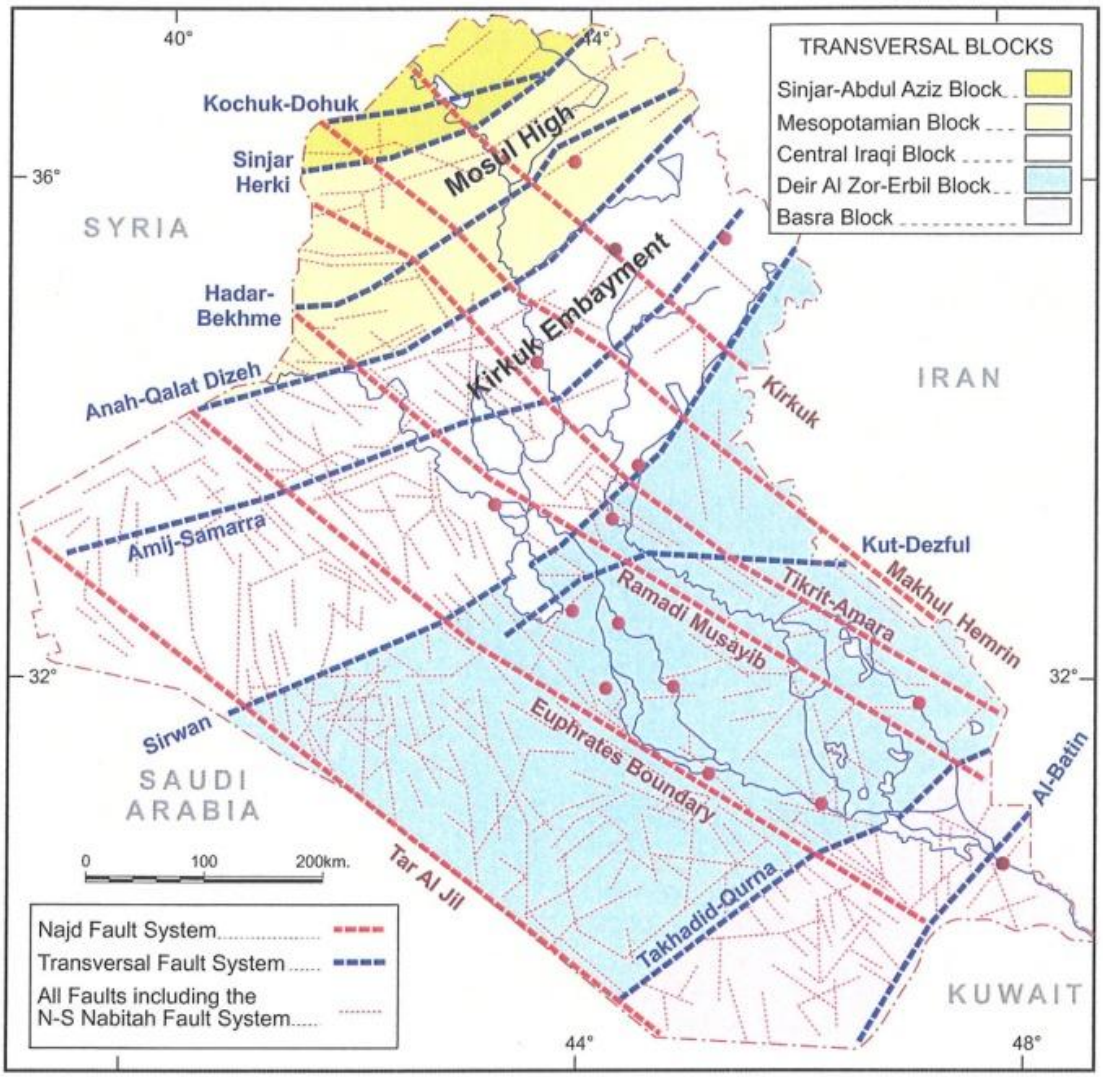


Figure A 8 Precambrian tectonic zones and fault systems of Iraq (Aqrawi *et al.*, 2010)

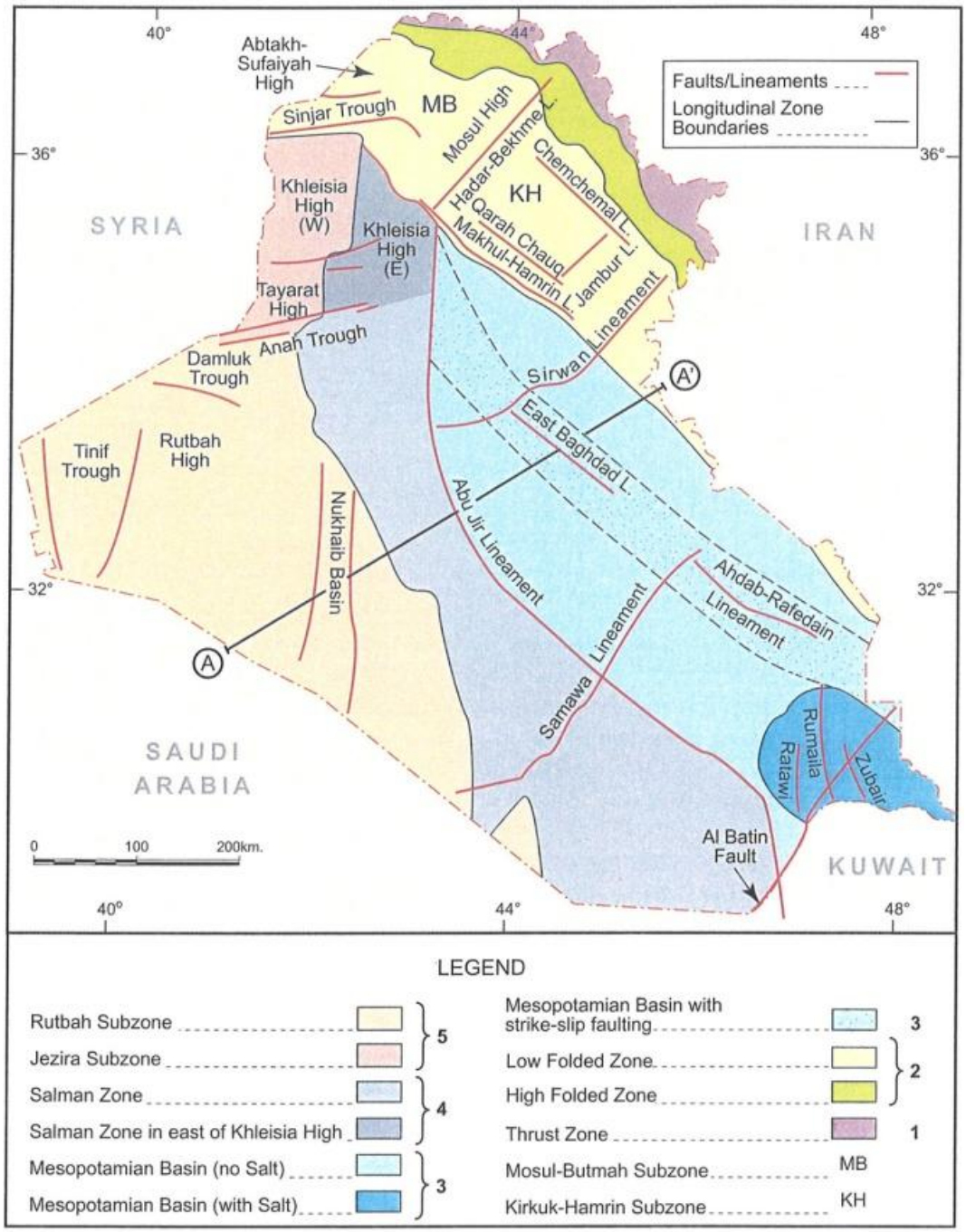


Figure A 9 Structural-tectonic zones of Iraq (Aqrawi *et al.*, 2010)

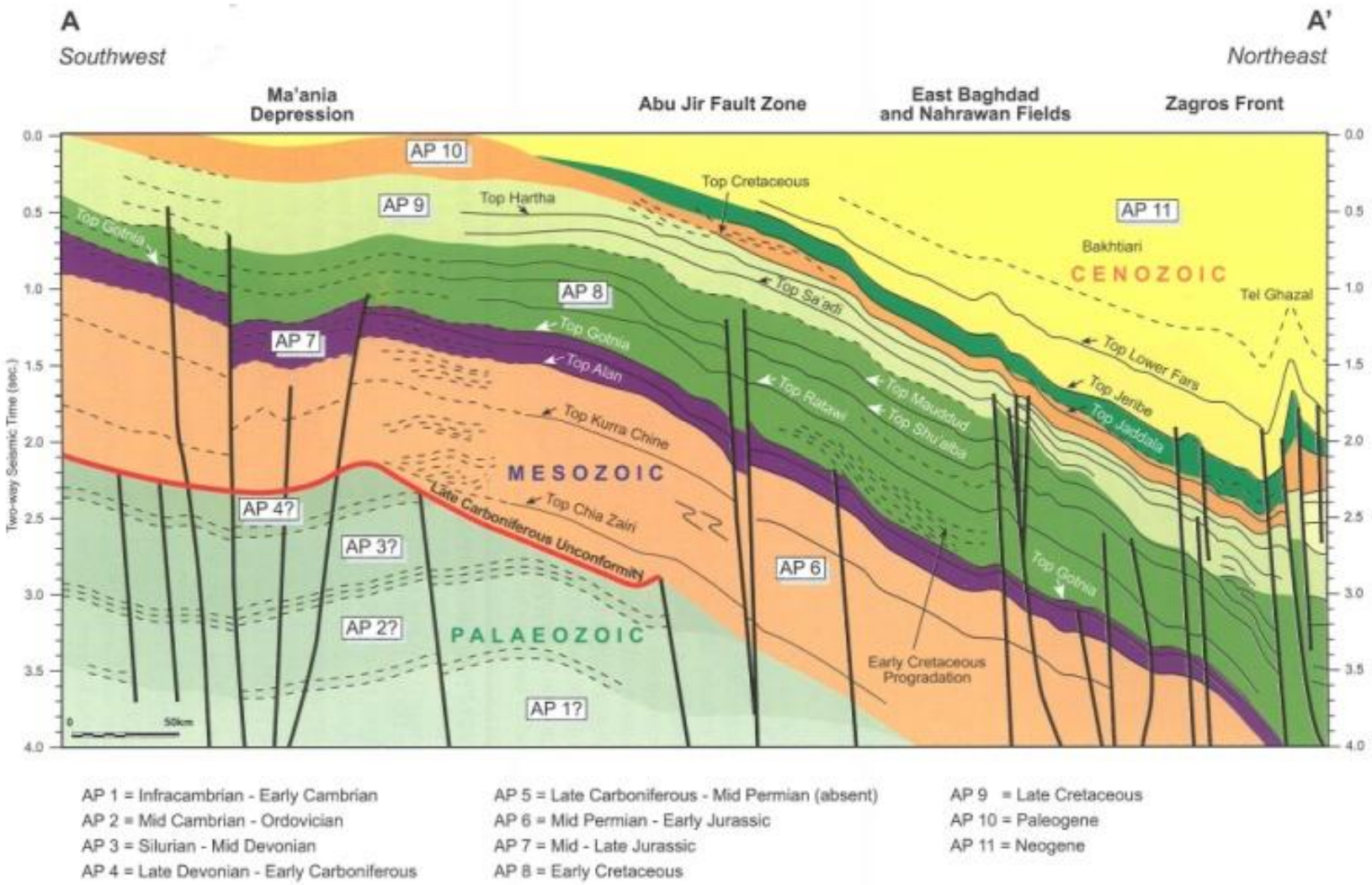


Figure A 10 Regional-scale SW-NE seismic profile across central Iraq (Aqrawi *et al.*, 2010) (Section Location as shown in Figure A9)

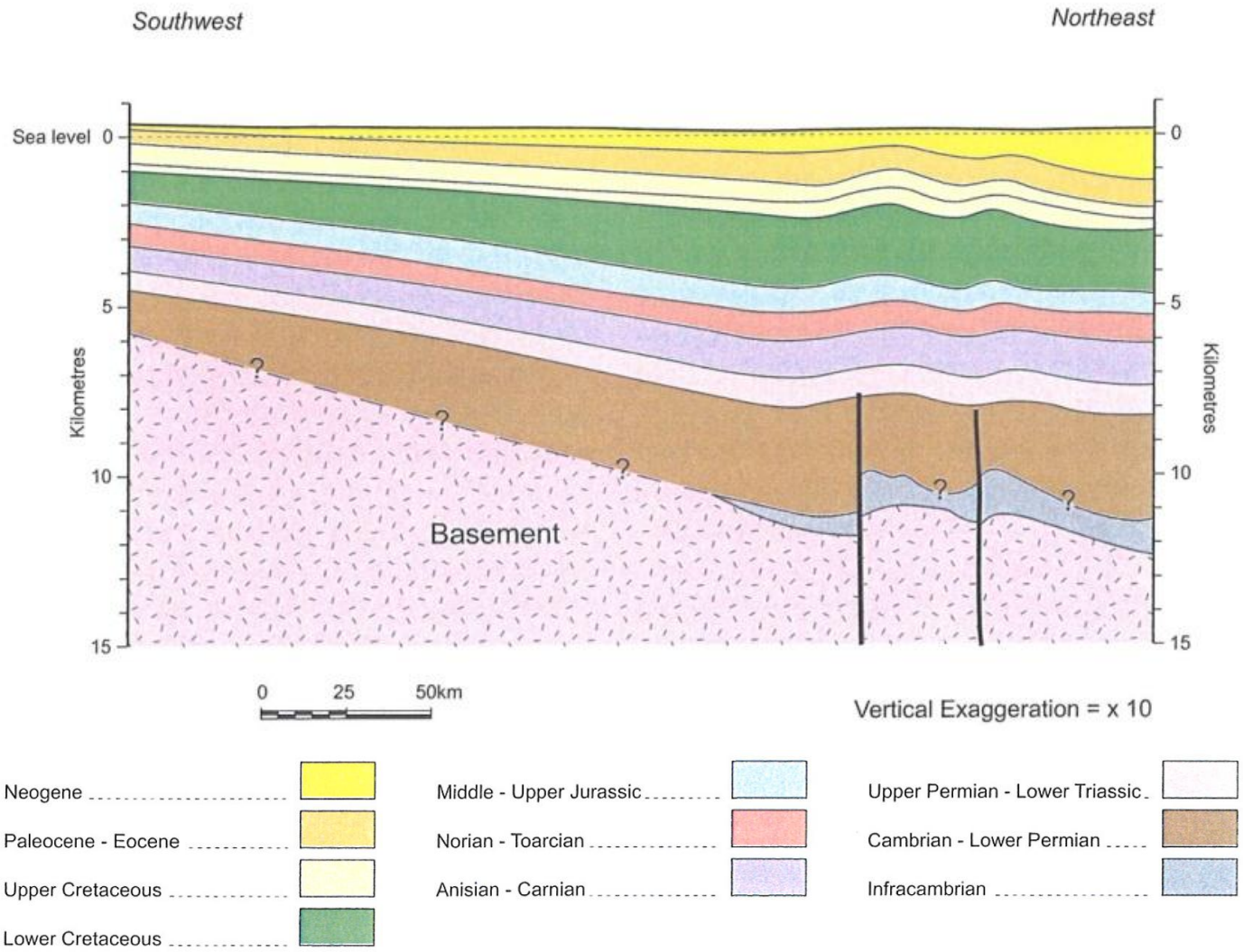


Figure A 1 SW-NE Structural Section 1 (Aqrawi *et al.*, 2010)

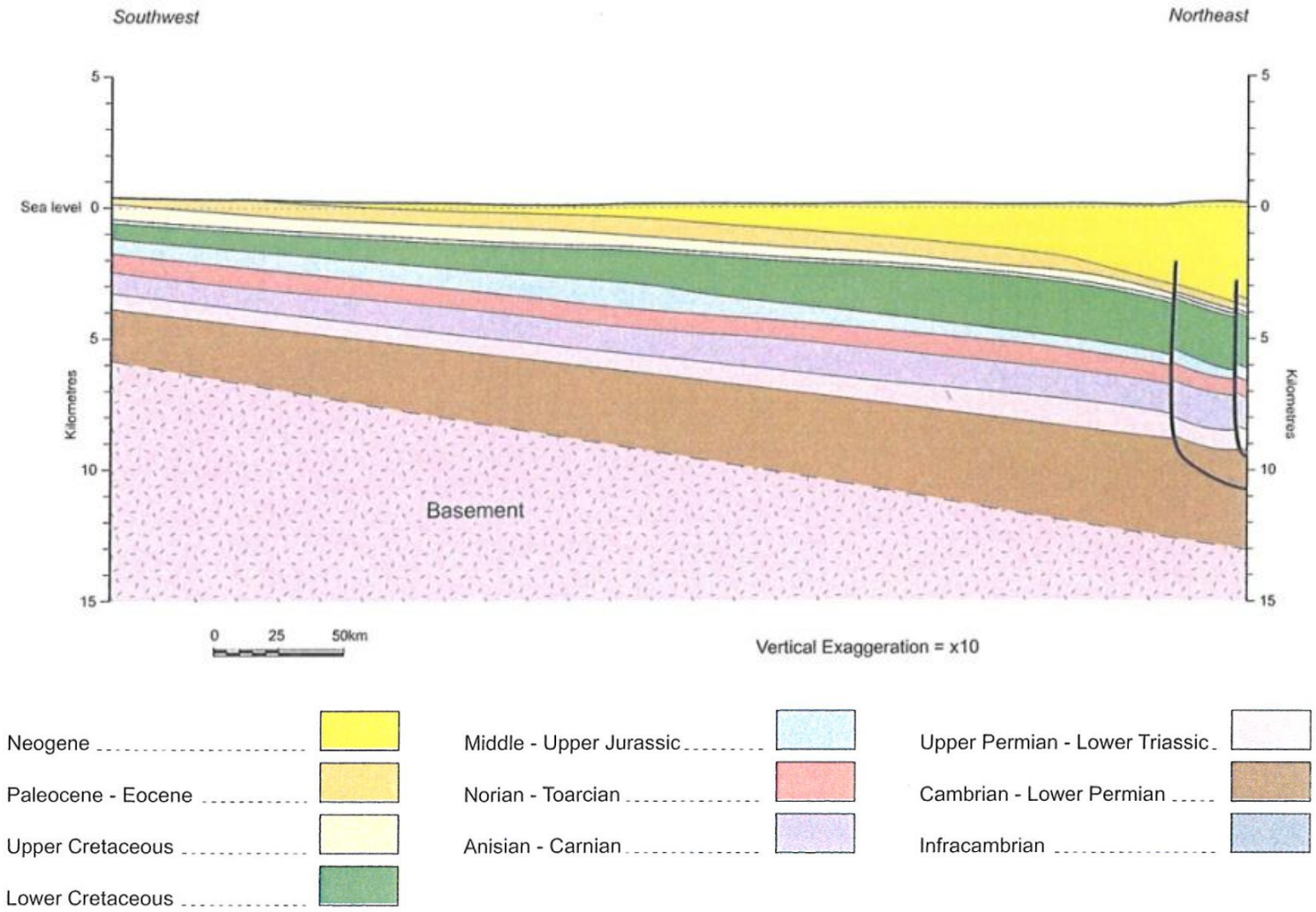


Figure A 2 SW-NE Structural Section 2 (Aqrawi *et al.*, 2010)

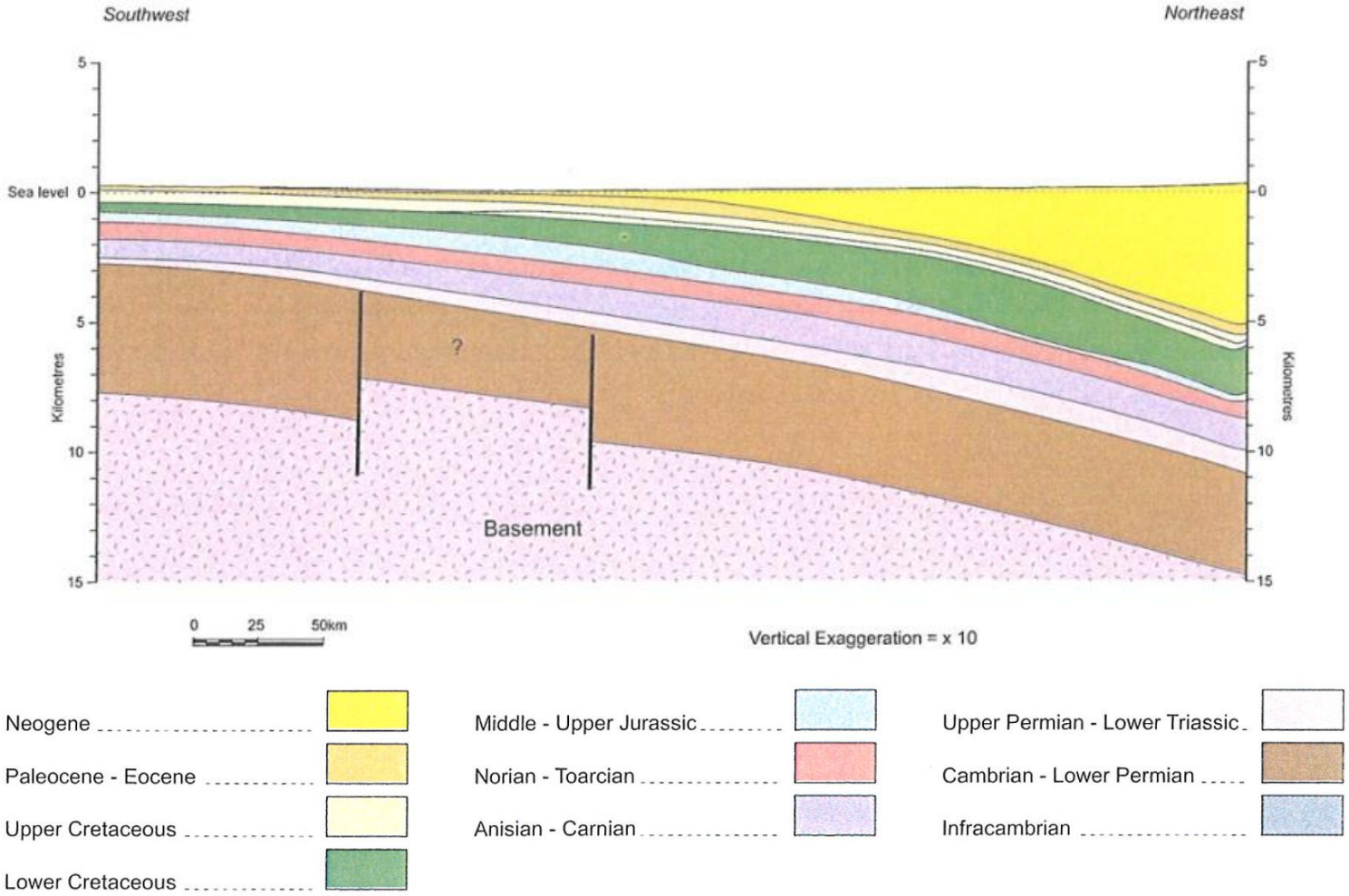


Figure A 3 SW-NE Structural Section 3 (Aqrawi *et al.*, 2010)

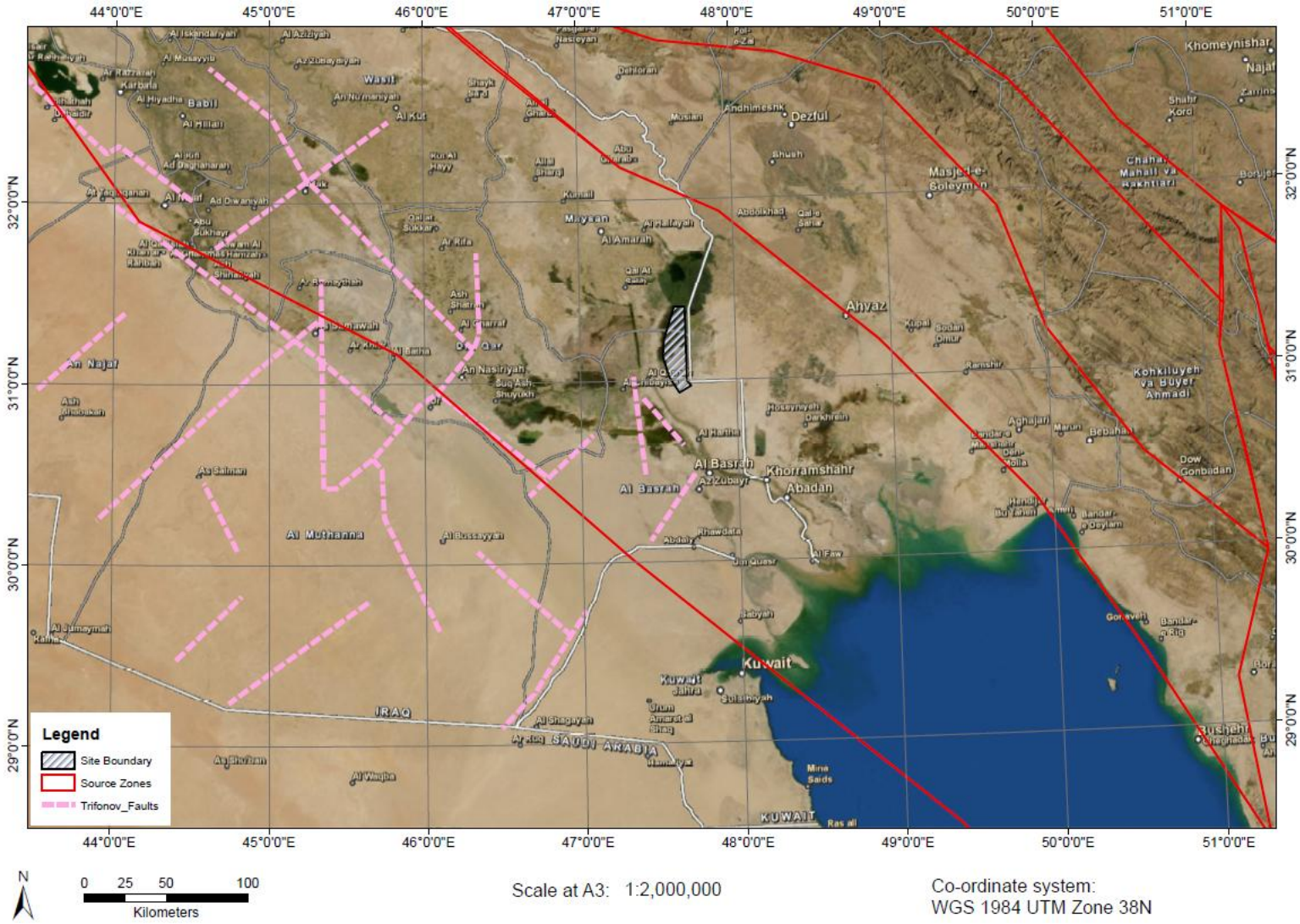


Figure A 4 Trifonov Faults in the region (Trifonov *et al.*, 1999)

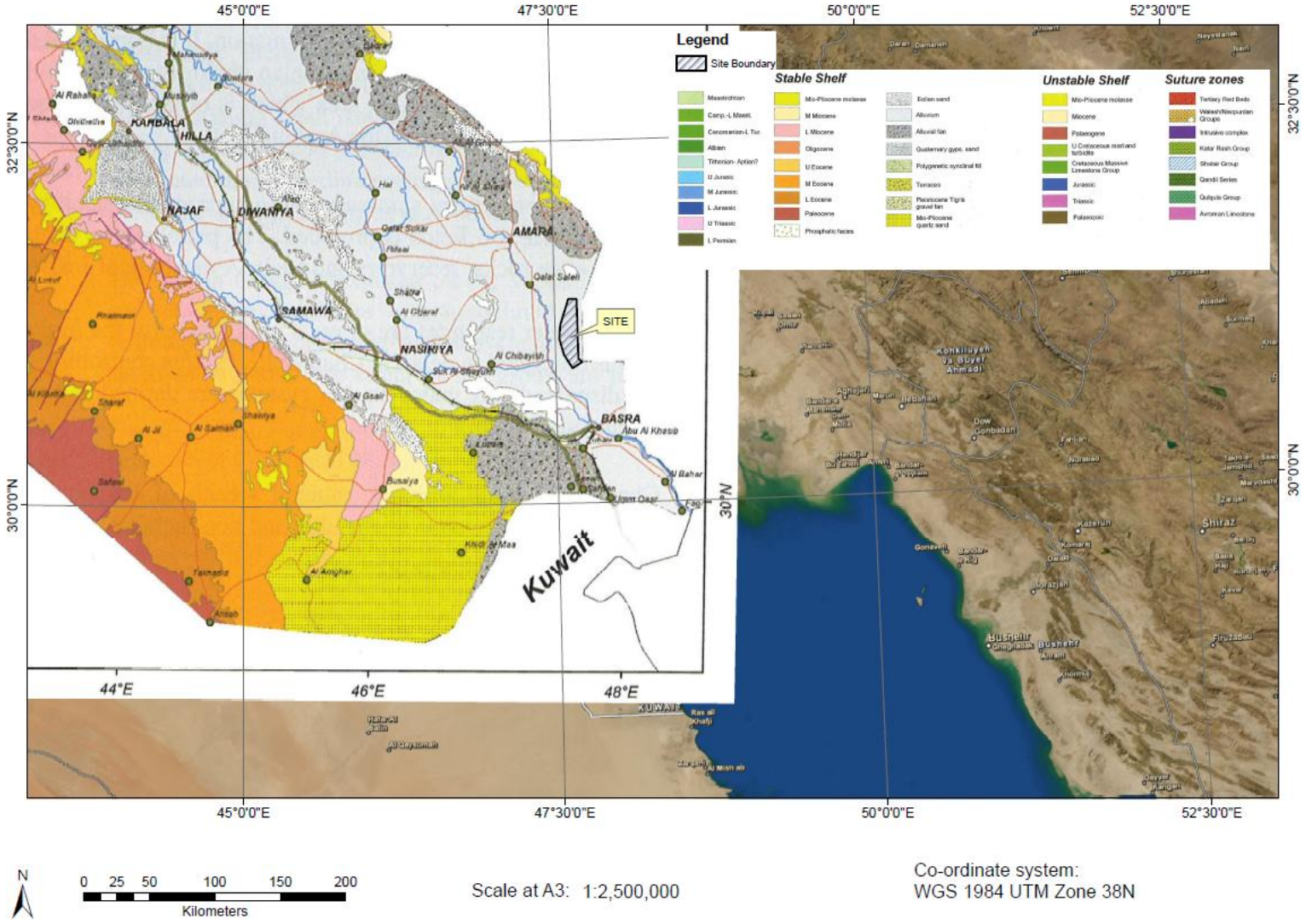


Figure A 5 Geology of Iraq (Jassim and Goff, 2006a)

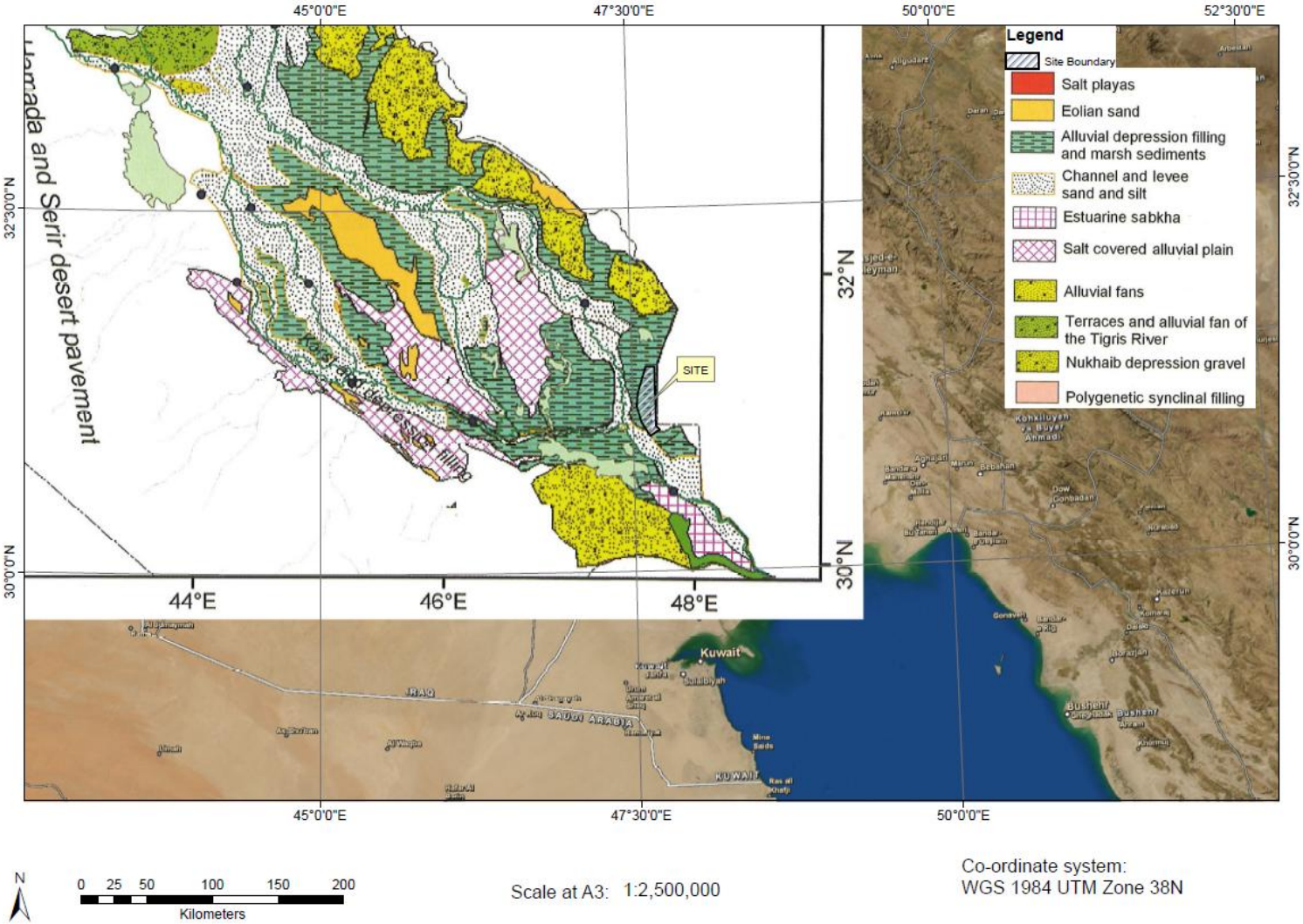


Figure A 6 Quaternary geology of Iraq (Aqrawi *et al.*, 2006)

Appendix B

Earthquake Catalogue

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
-300	1	1	35.5	51.8	33	7.6
-280	1	1	35.6	51.4	0	7.4
-4	1	1	35.5	51.8	0	7.6
735	1	1	39.7	45.6	0	6.5
743	1	1	35.3	52.2	33	7.2
819	6	1	39.3	45.4	0	7.4
840	1	1	31.3	48.8	33	6.5
851	1	1	40.0	44.6	0	5.5
855	1	1	35.6	51.5	33	7.1
856	1	22	36.0	54.3	0	7.4
858	1	1	38.1	46.3	0	6.0
858	1	1	40.0	44.6	0	5.4
859	1	1	33.2	44.6	33	5.3
863	2	13	40.0	44.6	0	5.5
864	1	1	35.7	51.0	0	5.5
872	6	22	33.2	47.2	33	6.8
893	1	1	38.3	48.3	20	6.3
893	12	24	40.0	44.6	0	6.0
906	4	1	39.7	45.0	0	6.1
956	1	1	34.8	48.1	33	5.5
958	2	23	36.0	51.1	0	7.7
958	4	1	34.5	45.9	33	6.4
978	6	17	27.7	52.3	33	5.5
995	1	1	38.7	40.0	0	7.4
1008	1	1	27.7	52.3	33	6.5
1008	4	27	34.6	47.4	33	7.0
1042	11	4	38.1	46.3	0	7.6
1052	1	1	31.5	50.0	33	6.8
1058	12	8	34.3	44.7	33	6.4
1085	1	1	30.7	50.3	33	5.9
1087	1	1	34.8	48.5	33	5.9
1107	9	1	34.6	47.4	33	6.5
1119	12	10	35.7	49.9	0	6.5
1127	1	1	36.3	53.6	0	6.8
1130	2	27	33.6	45.7	33	6.8
1135	8	13	36.1	45.9	0	6.4
1150	4	1	34.5	45.9	33	5.9
1177	5	1	35.7	50.7	0	7.2
1179	4	29	36.5	44.1	0	6.6
1194	3	1	32.0	44.3	33	5.3
1226	11	18	35.3	46.0	0	6.5
1301	1	1	36.1	53.2	0	6.7
1304	11	7	38.5	45.5	0	6.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1310	1	1	35.6	46.1	0	5.5
1316	1	5	33.5	49.4	33	6.2
1319	1	1	39.1	44.5	0	5.5
1344	1	1	32.9	52.3	33	5.8
1400	1	1	27.7	54.3	33	5.5
1430	1	1	32.2	46.4	33	5.5
1430	1	1	34.5	48.0	33	5.9
1440	1	1	28.4	53.1	33	7.1
1457	10	10	31.9	46.9	33	6.1
1459	10	10	31.1	52.1	33	6.6
1470	1	1	37.1	54.6	0	5.7
1482	1	1	39.9	40.4	0	7.6
1485	8	15	36.7	50.5	0	7.2
1495	1	1	34.5	50.0	33	5.9
1503	1	1	37.4	43.8	0	6.9
1591	1	1	29.8	52.4	33	5.9
1593	1	1	37.8	47.5	0	6.1
1593	9	1	27.7	54.3	33	6.5
1608	4	20	36.4	50.5	0	7.6
1640	2	27	38.2	46.3	15	5.3
1641	2	5	37.9	46.1	0	6.8
1646	4	7	38.3	43.7	0	7.4
1665	1	1	35.7	52.1	0	6.5
1666	1	1	32.1	50.5	33	6.5
1666	9	23	36.7	43.5	0	7.4
1677	1	1	27.9	54.2	33	6.4
1678	2	3	37.2	50.0	0	6.5
1687	1	1	36.3	52.6	0	6.5
1696	4	14	39.1	43.9	0	7.0
1703	1	1	26.6	54.9	33	6.8
1715	3	8	38.4	43.9	0	6.6
1717	3	12	38.1	46.3	0	5.9
1721	4	26	37.9	46.7	0	7.7
1755	6	7	34.0	51.4	33	5.9
1778	12	15	34.0	51.3	14	6.2
1780	1	8	38.2	46.0	0	7.7
1784	7	18	39.5	40.2	0	7.6
1786	1	0	38.3	45.6	0	6.3
1800	1	1	36.2	53.3	0	6.6
1808	6	26	35.3	54.5	0	6.6
1808	12	16	36.4	50.3	0	5.9
1809	1	1	36.3	52.5	0	6.5
1824	6	25	29.8	52.4	14	6.4

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1825	1	1	36.1	52.6	0	6.7
1830	3	27	35.7	52.5	0	7.1
1834	1	1	39.7	43.7	0	6.0
1840	7	2	39.5	43.9	0	7.4
1843	4	18	38.7	44.9	0	5.9
1844	5	12	33.6	51.4	14	6.4
1844	5	13	37.4	48.0	0	6.9
1851	4	9	40.0	47.3	0	6.2
1852	7	24	39.9	41.3	0	7.4
1853	5	4	39.6	52.5	0	6.5
1853	5	5	29.6	52.5	0	6.2
1853	6	5	31.3	51.9	33	5.7
1853	6	11	32.6	50.3	33	5.7
1857	4	9	38.4	42.1	0	6.7
1858	6	13	29.6	50.5	33	5.9
1859	6	2	39.9	41.3	0	6.2
1861	5	24	39.4	47.5	0	6.0
1862	12	19	39.3	47.8	0	6.1
1862	12	21	29.5	52.5	12	6.2
1863	12	30	38.2	48.6	0	6.1
1864	12	7	33.3	45.9	0	6.4
1865	1	1	27.2	53.1	6	5.7
1865	6	1	29.6	53.1	33	6.0
1866	5	12	39.2	41.0	0	7.2
1868	3	18	39.6	47.6	0	6.0
1868	4	23	40.0	41.7	0	6.8
1868	8	1	34.9	52.5	33	6.4
1872	6	1	34.7	47.7	5	6.1
1875	3	21	30.5	50.5	23	5.8
1876	9	28	33.1	49.7	16	5.9
1876	10	20	35.8	49.8	19	5.8
1879	3	22	37.8	47.9	0	6.7
1880	7	4	36.5	47.5	0	5.7
1883	5	3	37.9	47.2	0	6.2
1883	10	16	27.7	52.3	20	5.9
1890	3	25	28.8	53.5	14	6.4
1890	7	11	36.6	54.6	0	7.2
1894	2	26	29.5	53.3	12	5.9
1895	7	8	39.9	53.7	0	7.5
1896	1	4	37.8	48.4	0	6.7
1898	1	15	36.5	54.9	5	4.5
1900	2	24	38.5	44.9	0	5.6
1901	5	20	36.4	50.5	0	5.6

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1901	11	8	40.0	41.4	0	6.0
1902	9	5	39.5	48.0	20	5.2
1903	2	9	36.6	47.7	0	5.7
1903	4	28	39.1	42.6	0	7.0
1903	6	24	37.6	49.6	0	6.0
1905	1	9	37.0	48.7	0	6.2
1905	1	9	37.9	47.8	0	6.0
1907	3	29	38.4	42.1	0	5.7
1907	3	31	30.0	50.0	0	5.9
1907	6	3	38.7	41.5	0	5.3
1908	2	21	39.9	41.3	0	5.0
1908	4	22	38.0	48.0	33	7.0
1908	9	28	38.0	44.0	0	6.0
1909	1	23	33.4	49.1	0	7.4
1909	1	26	39.1	45.5	0	5.1
1909	4	11	36.0	45.0	0	5.8
1909	4	29	35.0	53.0	33	6.8
1910	12	4	39.3	48.0	38	5.9
1911	1	20	29.3	51.2	0	5.5
1911	6	7	39.2	50.6	0	6.2
1911	6	23	40.0	48.0	11	5.2
1911	9	13	27.7	54.4	0	5.7
1912	8	19	40.0	48.6	35	5.1
1913	1	27	39.3	43.0	0	5.8
1913	3	24	26.8	53.7	0	5.9
1913	4	16	38.8	48.5	0	5.4
1913	11	12	38.8	45.8	25	4.9
1915	2	14	38.8	42.5	0	5.8
1915	2	28	37.4	43.1	0	5.5
1917	6	2	38.0	48.5	0	5.2
1917	7	15	33.5	45.8	0	5.7
1917	10	24	36.9	54.3	0	5.5
1917	11	23	33.5	46.5	0	6.1
1919	1	8	40.0	47.0	0	5.5
1919	5	12	36.2	44.0	0	5.8
1920	5	25	33.5	46.5	0	5.9
1920	10	14	36.2	44.0	0	5.1
1922	3	21	33.0	50.0	0	5.9
1923	6	18	34.8	46.0	0	5.0
1924	2	19	38.6	48.5	0	5.9
1924	2	19	39.4	48.6	30	5.2
1924	5	13	39.7	48.2	0	5.5
1924	6	30	27.5	53.8	0	5.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1924	7	25	38.0	43.0	0	5.0
1924	9	6	39.1	42.6	0	5.0
1924	9	13	39.9	41.9	35	6.9
1924	9	27	39.5	43.9	0	5.4
1924	11	8	35.5	48.0	0	5.7
1925	7	30	28.5	51.8	0	5.4
1925	12	18	28.5	51.3	0	5.6
1926	4	2	35.0	44.0	0	5.0
1927	7	22	33.5	54.0	0	5.0
1927	7	22	34.0	54.0	33	6.3
1927	7	23	34.7	54.0	0	6.1
1927	7	29	33.5	55.0	0	5.0
1927	7	30	28.7	51.9	0	4.8
1927	11	12	32.5	47.4	0	5.7
1927	11	15	33.5	48.0	0	5.0
1927	11	16	27.5	53.8	0	4.8
1928	3	24	37.8	47.3	0	5.1
1928	4	14	35.5	55.0	0	5.4
1928	4	15	27.5	52.1	0	5.3
1928	8	26	28.7	51.9	0	4.8
1928	9	18	32.5	53.0	0	4.8
1928	11	6	40.0	53.5	0	4.9
1929	1	21	30.5	54.5	0	5.0
1929	2	5	31.5	47.5	0	5.2
1929	7	15	32.1	49.5	33	6.0
1929	8	7	35.0	44.0	0	5.1
1929	10	15	38.0	42.0	0	5.0
1929	10	27	33.5	48.0	0	5.3
1929	10	29	25.0	51.5	0	5.0
1929	10	29	27.5	54.5	35	5.7
1930	1	2	35.8	52.0	0	5.5
1930	2	15	28.7	51.8	0	5.5
1930	4	3	32.5	43.7	0	5.0
1930	4	3	32.5	47.0	0	5.0
1930	4	15	29.0	54.0	35	5.7
1930	5	6	38.2	44.6	0	7.2
1930	5	10	37.5	44.0	0	4.9
1930	5	12	27.5	55.0	0	6.1
1930	5	23	37.5	44.5	0	5.4
1930	5	29	37.5	45.5	0	5.7
1930	8	21	37.0	44.0	0	4.9
1930	9	2	30.0	51.5	35	5.7
1930	10	2	35.8	52.0	33	5.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1930	10	18	29.4	51.4	0	4.8
1930	12	5	33.5	46.5	0	4.8
1931	1	4	32.5	53.0	0	4.8
1931	4	27	39.4	46.0	0	6.4
1931	5	3	30.5	54.5	0	5.0
1931	5	5	26.5	54.3	0	5.4
1931	5	7	26.0	54.8	0	5.6
1931	5	12	37.5	45.5	21	5.5
1931	7	4	38.0	45.6	0	5.0
1931	7	8	33.7	49.4	0	4.4
1931	7	28	29.5	52.0	35	5.7
1931	8	29	32.0	49.0	0	4.8
1931	12	24	37.3	44.8	0	5.1
1932	1	22	33.0	47.0	35	5.7
1932	3	15	34.0	48.0	35	5.7
1932	5	7	36.3	45.0	0	5.7
1932	5	20	36.5	53.5	0	5.7
1932	9	12	39.5	50.5	0	5.1
1933	4	16	39.0	48.5	146	5.0
1933	7	6	39.3	46.6	0	5.9
1934	2	4	30.3	51.5	0	6.3
1934	2	22	38.8	45.9	92	6.1
1934	3	10	26.5	52.5	0	5.0
1934	3	18	26.1	53.6	0	5.3
1934	3	19	27.3	52.7	0	5.5
1934	8	31	27.5	53.3	0	5.0
1934	10	29	39.9	47.8	0	6.1
1935	4	11	36.4	53.3	0	6.2
1935	4	13	34.8	52.2	0	5.3
1935	5	1	39.3	40.6	0	6.2
1935	5	31	31.9	47.9	0	5.5
1935	7	2	26.5	55.0	0	5.4
1935	10	15	28.9	51.3	0	5.5
1935	10	27	27.6	54.6	0	5.0
1936	1	8	26.9	52.9	0	5.3
1936	2	24	33.5	48.0	0	5.3
1936	5	1	39.6	43.1	0	5.7
1936	8	16	26.0	54.4	0	5.4
1936	8	20	30.4	51.5	0	5.5
1936	8	28	33.5	46.5	0	4.8
1937	4	7	34.8	52.1	0	5.9
1937	5	21	29.0	54.0	0	4.8
1937	11	19	32.5	49.0	0	4.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1938	1	26	33.4	45.8	0	5.6
1938	4	23	27.3	53.2	0	5.9
1939	1	14	32.6	49.0	0	5.8
1939	1	25	29.3	51.0	0	5.6
1939	4	6	35.5	54.5	0	6.0
1939	7	24	27.3	53.2	0	4.8
1939	8	18	26.8	54.5	0	5.3
1939	11	28	32.2	49.3	0	5.6
1940	3	17	38.0	43.0	0	5.2
1940	6	1	27.0	54.0	0	4.8
1940	7	6	33.2	46.4	0	5.0
1940	7	6	33.5	46.5	35	5.7
1940	9	25	36.2	52.2	0	5.2
1940	10	18	39.6	42.2	0	5.7
1941	2	4	27.3	53.2	0	4.8
1941	3	28	28.3	54.2	0	5.6
1941	6	15	26.4	53.3	0	5.5
1941	8	28	33.4	47.3	0	5.0
1941	9	10	39.5	43.0	0	6.1
1941	11	24	39.0	51.1	33	6.5
1942	4	27	39.8	54.0	0	5.2
1942	6	7	27.0	54.5	0	5.0
1943	6	29	39.9	41.3	0	5.0
1943	9	26	38.0	50.0	33	6.5
1943	11	29	38.5	41.5	0	5.3
1944	4	5	36.0	54.8	12	4.9
1944	4	5	36.7	54.5	13	5.8
1944	4	5	37.5	42.5	0	5.3
1944	6	28	36.0	45.0	0	5.7
1944	7	17	36.2	42.4	0	6.0
1945	1	15	27.0	54.8	0	5.7
1945	1	15	38.0	43.5	0	5.4
1945	3	12	31.1	47.1	0	5.6
1945	5	11	34.8	52.1	0	5.0
1945	5	11	35.2	52.4	33	5.0
1945	7	21	37.5	45.0	0	5.0
1945	9	1	39.0	43.3	0	5.9
1945	11	20	38.5	43.3	33	5.7
1946	3	5	39.6	49.3	11	5.0
1946	3	12	29.8	51.5	0	5.8
1946	5	29	30.5	54.5	0	4.8
1946	5	31	39.3	41.2	0	5.8
1946	5	31	40.0	41.5	0	6.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1946	7	17	35.0	46.0	0	6.0
1946	7	27	36.0	46.0	0	5.9
1946	8	17	35.6	45.8	33	5.9
1946	10	3	39.5	44.0	0	5.3
1946	10	23	30.0	47.5	0	5.3
1946	11	4	39.8	54.6	0	7.0
1947	1	2	28.5	51.9	0	5.3
1947	4	19	37.9	43.1	0	5.4
1947	12	14	39.9	42.5	0	5.7
1948	6	17	36.6	49.4	0	5.7
1948	6	20	39.3	41.2	27	5.0
1948	7	30	31.4	49.1	43	5.7
1948	8	5	31.0	49.0	0	5.0
1949	3	6	29.8	51.8	0	5.6
1949	5	8	37.3	44.6	0	5.1
1949	6	22	34.0	45.5	0	5.0
1949	8	17	39.4	40.8	0	6.9
1949	10	16	39.1	42.5	0	5.0
1949	12	16	27.0	54.5	0	5.0
1950	1	22	27.3	53.2	0	5.9
1950	1	30	34.0	45.5	0	5.3
1950	2	2	25.5	54.0	0	5.1
1950	2	2	29.0	49.0	0	5.1
1950	2	27	26.0	52.0	0	5.0
1950	5	1	38.9	45.2	51	5.2
1950	11	25	37.0	44.0	0	4.9
1951	3	15	38.4	44.0	0	5.2
1951	4	22	34.8	52.1	0	5.3
1951	6	5	36.2	48.3	81	5.1
1951	6	9	32.2	49.3	0	5.3
1951	7	19	27.1	51.7	0	4.8
1951	10	28	27.3	53.2	0	5.3
1952	1	31	40.0	41.7	0	6.1
1952	7	18	37.2	50.1	40	4.9
1952	8	1	29.8	51.8	0	5.0
1952	8	4	31.1	49.8	0	5.6
1952	8	13	33.7	46.8	0	5.9
1952	9	3	39.0	43.0	0	5.7
1952	12	4	27.3	53.2	0	5.0
1953	1	15	27.9	54.8	0	5.6
1953	3	23	39.3	41.2	0	5.5
1953	4	18	36.8	54.4	12	5.1
1953	12	30	31.8	46.5	0	5.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1954	3	28	39.1	41.0	0	6.9
1954	4	6	28.3	54.2	0	5.6
1954	8	20	27.8	52.1	0	5.3
1954	9	19	25.0	53.0	0	4.9
1954	10	22	38.8	45.8	26	5.0
1954	11	11	27.3	53.3	0	5.9
1955	4	18	27.7	52.3	0	5.3
1955	12	4	33.5	48.7	0	5.6
1956	2	3	33.1	46.6	0	5.6
1956	3	6	27.8	52.8	0	5.9
1956	4	12	37.3	50.3	30	5.7
1956	5	19	40.0	43.0	33	6.2
1956	8	8	32.0	49.8	33	5.1
1956	10	31	27.3	54.7	0	6.2
1956	11	1	27.5	54.0	0	5.3
1956	11	10	25.9	54.7	0	5.3
1957	1	2	26.7	54.8	0	5.5
1957	3	16	34.9	52.9	0	5.9
1957	5	6	37.2	51.8	12	5.0
1957	5	6	37.5	51.5	0	5.3
1957	7	2	36.1	52.5	0	6.8
1957	7	7	39.4	40.5	0	5.7
1957	9	5	28.5	53.6	0	5.9
1957	10	2	26.7	54.8	0	5.5
1957	10	11	31.0	55.0	0	5.0
1957	12	13	34.6	47.8	0	6.7
1957	12	16	34.3	47.7	68	5.3
1958	1	16	34.0	50.0	0	5.0
1958	3	1	27.7	54.9	0	5.9
1958	4	9	29.1	52.0	0	5.3
1958	5	2	28.5	55.0	0	5.3
1958	5	5	36.5	45.5	0	5.7
1958	6	10	30.3	51.1	0	5.9
1958	7	26	39.8	45.6	33	6.0
1958	8	15	33.5	48.5	0	4.4
1958	8	16	34.0	48.5	33	5.3
1958	8	17	34.0	48.0	33	5.6
1958	8	19	34.2	48.2	86	5.3
1958	9	3	34.0	47.0	0	5.3
1958	9	10	32.5	47.5	0	4.8
1958	9	21	34.5	46.5	0	4.8
1958	10	6	36.5	54.0	0	5.4
1958	10	23	33.6	46.2	0	5.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1958	10	26	37.4	44.5	40	5.5
1959	1	7	27.0	54.2	0	5.5
1959	3	2	33.1	49.5	0	5.6
1959	4	29	27.0	54.8	0	5.3
1959	5	1	37.0	51.5	0	5.9
1959	5	31	37.7	48.9	0	5.2
1959	7	18	29.8	51.4	88	5.1
1959	7	31	38.9	49.4	35	5.0
1959	8	13	39.9	48.5	48	5.5
1959	8	24	39.0	40.0	0	4.9
1959	9	10	39.2	41.6	0	5.9
1959	9	19	29.1	51.3	95	5.3
1959	11	13	34.5	46.5	0	4.8
1960	1	2	25.8	55.0	33	5.1
1960	1	6	32.0	54.5	33	5.2
1960	2	4	29.0	52.4	24	5.1
1960	2	20	37.5	44.5	0	5.8
1960	2	21	38.0	42.0	0	5.7
1960	3	14	29.7	50.4	47	5.3
1960	3	19	38.5	44.5	0	4.9
1960	3	20	38.3	46.0	0	5.4
1960	3	20	39.0	44.0	0	5.7
1960	3	24	31.3	51.0	33	6.1
1960	4	23	31.1	50.3	84	5.0
1960	5	10	27.0	47.5	0	4.8
1960	5	18	27.1	53.1	0	5.9
1960	5	20	27.5	53.1	53	5.6
1960	5	25	27.2	54.2	0	4.8
1960	5	28	29.8	52.3	33	5.2
1960	6	2	33.1	48.8	0	5.6
1960	6	10	26.5	53.0	0	5.0
1960	6	23	37.0	49.5	0	6.6
1960	7	4	30.0	52.0	0	4.8
1960	7	9	28.0	52.5	0	4.4
1960	7	23	34.5	50.5	33	5.3
1960	7	29	27.5	54.5	100	5.1
1960	8	1	28.1	54.4	62	6.4
1960	9	21	31.8	50.5	65	4.8
1960	9	25	28.4	53.2	53	4.8
1960	11	4	27.0	54.0	0	6.2
1960	11	19	30.5	51.6	33	5.5
1960	11	22	36.1	52.3	21	6.4
1960	11	25	39.5	47.5	33	6.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1960	12	3	30.0	52.0	33	5.2
1961	6	11	27.8	54.5	0	6.5
1961	6	25	27.9	53.7	54	4.8
1961	9	13	32.0	47.0	0	5.0
1961	9	13	33.0	47.3	33	4.8
1961	9	14	32.8	47.5	90	5.8
1961	10	3	34.3	47.9	59	5.1
1961	10	14	34.1	48.5	84	5.5
1961	10	28	33.3	48.7	59	5.3
1961	12	17	38.5	50.5	0	5.3
1962	1	20	31.2	48.9	33	4.8
1962	2	3	30.2	52.0	0	4.8
1962	2	8	31.0	49.0	0	4.9
1962	6	23	29.7	49.3	0	5.6
1962	6	29	32.4	48.8	60	5.3
1962	9	1	35.7	49.8	10	7.0
1962	9	4	39.9	43.9	33	6.2
1962	9	11	34.7	48.8	33	4.2
1962	9	19	30.1	50.4	62	5.3
1962	11	9	33.5	47.2	56	5.6
1962	12	8	36.5	54.7	0	5.2
1963	2	4	26.9	54.1	33	4.7
1963	3	24	34.4	47.8	0	5.9
1963	4	16	35.8	44.4	0	5.8
1963	5	2	28.5	54.9	46	6.2
1963	5	3	30.7	51.8	35	5.7
1963	5	29	28.2	52.5	44	4.8
1963	6	30	33.6	49.2	33	5.7
1963	7	13	29.6	50.9	43	5.3
1963	8	10	28.1	53.3	46	5.1
1963	8	12	27.7	53.2	33	5.3
1963	12	21	33.8	51.5	51	4.8
1964	1	12	31.5	49.2	56	5.4
1964	1	19	26.8	53.9	36	5.5
1964	2	8	37.1	51.0	40	4.9
1964	2	14	29.2	54.5	47	5.0
1964	2	16	30.0	51.2	33	5.7
1964	2	24	39.9	40.3	57	4.7
1964	2	26	27.3	54.4	14	5.1
1964	4	13	40.0	52.0	51	5.1
1964	5	9	29.5	52.4	36	5.1
1964	6	5	39.1	43.2	42	4.9
1964	6	9	28.9	52.8	59	5.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1964	6	9	38.7	40.2	65	4.4
1964	8	4	34.3	46.0	31	5.0
1964	8	12	30.9	49.7	34	5.6
1964	8	16	39.6	52.4	35	5.1
1964	8	20	28.1	52.6	40	6.0
1964	9	4	39.4	40.3	54	5.1
1964	9	9	35.0	46.0	69	5.1
1964	9	19	37.5	40.0	0	4.9
1964	10	13	34.7	46.0	147	4.8
1964	10	18	27.8	54.9	53	5.2
1964	11	8	29.6	51.0	36	5.7
1964	11	9	39.8	48.5	47	5.3
1964	11	10	32.7	49.2	55	5.7
1964	11	15	35.5	45.5	20	5.1
1964	11	16	39.4	40.4	10	5.2
1964	11	26	32.9	49.1	99	4.8
1964	12	1	36.8	54.6	33	4.9
1964	12	11	28.5	53.0	59	5.3
1965	1	23	39.2	49.0	65	4.7
1965	2	10	37.7	47.1	45	5.3
1965	3	25	32.2	50.4	55	5.0
1965	4	11	30.7	51.9	76	5.0
1965	4	25	30.4	50.6	47	4.8
1965	4	26	27.4	52.4	33	5.1
1965	5	7	32.4	48.8	70	4.7
1965	5	7	36.2	54.8	62	4.9
1965	5	11	39.9	51.0	27	4.8
1965	5	12	34.4	47.5	43	4.4
1965	5	26	35.4	44.6	67	5.0
1965	6	18	29.7	51.4	65	5.3
1965	6	24	29.3	53.0	105	4.9
1965	6	26	32.2	49.4	26	4.8
1965	6	28	38.0	41.3	33	5.4
1965	8	31	39.4	40.8	6	5.4
1965	9	8	32.9	48.4	50	5.0
1965	9	20	30.6	50.1	54	5.2
1965	11	10	27.0	54.6	33	5.3
1965	12	13	30.9	51.1	33	5.2
1965	12	23	27.6	54.5	37	5.1
1966	1	16	31.0	50.5	61	4.6
1966	1	31	32.5	48.8	11	4.4
1966	2	1	34.9	46.1	86	4.9
1966	2	26	30.6	50.8	60	5.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1966	3	10	39.9	41.6	45	4.7
1966	3	16	34.3	46.2	84	4.7
1966	4	27	38.1	42.5	10	5.2
1966	5	2	38.1	42.6	55	4.9
1966	5	9	38.3	42.3	92	4.7
1966	6	9	27.6	52.6	35	5.3
1966	6	13	32.1	54.4	48	5.1
1966	7	8	26.5	54.7	38	4.7
1966	7	27	32.6	49.0	100	5.0
1966	7	27	32.7	48.8	45	5.4
1966	7	27	32.7	49.4	95	4.8
1966	7	29	28.3	51.6	38	5.0
1966	8	19	38.4	41.2	172	4.7
1966	8	19	39.2	41.4	16	6.8
1966	8	20	39.3	40.8	70	4.4
1966	8	20	39.3	40.5	34	4.8
1966	8	21	39.8	42.0	125	4.6
1966	8	31	38.9	41.5	131	4.4
1966	9	18	27.8	54.3	18	5.6
1966	9	24	27.4	54.6	46	5.7
1966	10	3	35.8	53.4	14	5.2
1966	11	8	36.1	50.8	15	5.1
1966	12	2	28.2	53.6	35	5.3
1966	12	26	38.8	40.9	38	5.0
1967	1	2	30.7	50.5	60	5.4
1967	1	11	34.1	45.7	15	6.0
1967	1	15	30.0	51.6	90	5.3
1967	2	3	36.7	53.7	37	4.6
1967	2	15	34.6	47.6	51	5.2
1967	2	16	33.8	48.1	29	4.7
1967	2	16	35.4	51.9	144	4.8
1967	2	21	31.7	49.1	70	4.9
1967	3	3	30.2	50.7	74	5.7
1967	3	20	35.9	44.0	10	5.1
1967	4	6	29.9	51.0	20	5.6
1967	4	28	33.8	44.4	38	4.6
1967	4	30	31.6	49.6	74	4.3
1967	5	17	38.6	44.2	10	5.0
1967	5	20	29.6	52.2	32	4.8
1967	6	23	35.5	49.6	38	4.6
1967	7	1	32.5	48.8	70	4.2
1967	7	10	28.0	53.5	33	4.3
1967	7	14	35.0	46.3	108	4.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1967	7	25	28.8	54.6	71	4.9
1967	7	26	39.5	40.3	21	6.2
1967	7	27	31.6	50.4	73	5.2
1967	8	1	39.9	53.4	33	5.1
1967	8	2	30.7	53.5	57	4.8
1967	8	25	35.6	49.2	8	5.0
1967	9	2	36.7	55.0	36	5.4
1967	10	27	34.3	46.2	86	5.2
1967	11	10	36.0	53.9	5	5.2
1967	11	15	30.6	51.5	84	4.9
1967	11	21	30.5	50.5	121	4.9
1967	11	22	26.0	54.0	33	5.1
1967	12	18	33.5	47.0	49	4.9
1968	1	2	29.5	52.6	34	5.1
1968	1	22	33.8	46.8	51	5.2
1968	4	3	32.6	48.7	34	4.8
1968	4	26	35.1	50.2	21	5.6
1968	4	29	39.2	44.2	10	5.7
1968	5	2	23.0	41.9	33	5.4
1968	5	19	36.6	53.4	22	4.9
1968	5	22	33.2	49.3	51	4.8
1968	5	30	27.8	53.9	40	5.6
1968	6	4	32.9	48.3	45	5.6
1968	6	4	37.5	49.2	49	4.9
1968	6	9	39.1	46.1	5	5.3
1968	6	11	38.2	42.9	53	5.0
1968	6	15	29.8	51.9	88	4.8
1968	6	25	39.6	49.3	28	4.7
1968	7	12	29.8	50.7	45	5.0
1968	7	21	30.2	51.0	73	4.7
1968	7	29	36.7	53.9	14	4.8
1968	8	2	36.9	49.3	36	5.0
1968	8	10	37.0	43.1	10	5.3
1968	9	14	28.4	53.3	7	6.2
1968	9	16	39.3	46.3	44	4.7
1968	9	23	36.5	40.7	49	5.0
1968	10	16	32.6	48.9	68	4.2
1968	11	6	31.8	50.8	51	5.0
1968	11	18	27.4	53.2	89	4.4
1968	12	12	35.8	53.5	27	5.2
1969	1	10	32.4	48.7	54	4.8
1969	1	26	36.8	54.5	10	5.0
1969	2	5	38.6	45.7	39	4.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1969	3	26	39.0	53.5	130	4.3
1969	4	14	27.8	54.7	50	5.2
1969	4	29	29.6	51.5	23	5.9
1969	5	14	38.9	44.6	57	4.6
1969	5	27	38.7	43.4	65	4.6
1969	7	23	38.9	41.0	169	4.6
1969	8	1	34.8	46.4	225	4.8
1969	9	1	30.8	49.7	54	5.2
1969	9	10	39.2	41.5	35	5.7
1969	10	1	39.3	40.6	25	5.0
1969	10	7	36.7	43.6	40	4.3
1969	10	20	32.0	49.6	52	5.1
1969	10	31	33.2	47.9	77	5.3
1969	11	7	26.6	53.6	23	5.3
1969	11	11	33.4	55.0	35	5.3
1969	11	28	36.8	45.0	34	4.9
1969	12	25	39.2	42.6	66	4.9
1970	1	3	32.6	48.8	44	5.4
1970	1	19	37.0	49.0	47	4.9
1970	1	20	30.4	51.4	73	5.1
1970	2	14	33.5	48.5	33	4.9
1970	2	17	38.6	43.3	15	5.0
1970	2	21	35.0	46.4	51	4.4
1970	2	23	27.8	54.5	33	5.7
1970	3	14	38.6	44.8	15	5.6
1970	3	15	32.1	49.0	37	5.0
1970	4	3	37.1	54.7	26	5.3
1970	4	16	38.8	48.6	30	4.9
1970	5	11	28.6	52.3	34	5.3
1970	5	18	27.7	52.9	42	5.0
1970	5	24	32.7	40.7	33	4.2
1970	5	31	27.4	52.7	0	5.0
1970	6	7	33.0	49.3	57	4.9
1970	6	26	38.7	45.1	65	4.8
1970	6	27	35.1	50.8	25	5.1
1970	6	30	31.5	53.6	49	4.2
1970	7	4	26.7	54.8	38	4.8
1970	7	11	37.5	49.0	20	5.6
1970	7	12	30.4	51.7	53	4.7
1970	7	21	29.5	52.0	97	4.9
1970	8	20	29.4	51.6	28	5.1
1970	9	3	40.0	53.6	36	4.6
1970	10	3	33.9	47.6	85	5.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1970	10	3	36.0	51.3	78	4.3
1970	10	25	36.7	45.2	10	5.5
1970	10	29	38.4	45.5	59	4.8
1970	11	28	38.0	42.7	53	4.3
1970	11	29	39.9	54.8	34	4.9
1970	12	23	38.7	48.7	72	4.2
1971	1	20	35.0	46.9	20	5.3
1971	3	16	32.1	49.4	40	4.3
1971	4	3	33.2	46.5	51	4.3
1971	4	6	29.8	51.9	8	5.5
1971	4	30	34.7	50.3	38	5.0
1971	5	15	38.0	49.0	50	5.0
1971	5	22	38.9	40.6	9	6.6
1971	5	22	39.0	40.3	80	4.6
1971	5	24	39.4	40.6	62	4.7
1971	5	25	27.4	53.5	42	5.0
1971	5	27	28.1	51.8	51	5.0
1971	5	31	28.9	54.6	60	4.7
1971	6	2	29.4	51.7	34	5.0
1971	6	2	34.6	47.0	25	4.6
1971	6	28	26.9	54.9	0	4.3
1971	7	1	36.4	43.4	10	5.3
1971	7	18	34.0	45.2	0	5.0
1971	8	9	36.2	52.8	30	5.6
1971	8	25	28.2	52.3	0	4.3
1971	9	21	38.6	44.1	17	4.6
1971	10	5	31.6	50.7	66	4.3
1971	10	15	37.3	54.6	41	4.9
1971	10	23	29.6	51.4	16	5.0
1971	11	8	26.9	54.7	67	5.2
1971	11	8	27.0	54.5	7	6.0
1971	11	29	29.5	52.8	18	5.2
1971	12	7	39.1	40.1	71	4.6
1972	1	5	32.9	49.2	46	4.7
1972	1	14	32.9	46.8	40	5.4
1972	1	18	37.5	48.8	10	5.1
1972	2	5	34.0	47.2	44	4.9
1972	2	8	29.7	51.0	53	4.8
1972	2	9	29.4	50.8	43	4.6
1972	2	10	29.5	51.1	84	4.9
1972	3	12	27.8	53.4	48	5.2
1972	4	10	28.3	53.0	9	6.7
1972	4	12	28.5	53.1	96	5.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1972	4	18	39.9	51.4	55	5.0
1972	6	6	26.9	53.4	43	5.3
1972	6	8	34.1	46.3	46	5.2
1972	6	10	32.9	46.3	0	4.2
1972	6	12	33.0	46.3	34	5.7
1972	6	12	33.4	45.7	134	5.3
1972	7	2	30.1	50.9	27	5.5
1972	7	11	36.1	45.7	10	4.6
1972	7	16	38.2	43.3	15	5.2
1972	7	24	39.5	40.6	40	4.4
1972	8	6	31.7	50.0	26	5.3
1972	8	8	36.5	52.8	42	5.1
1972	9	2	39.9	53.7	40	5.1
1972	10	9	29.6	52.5	27	4.6
1972	10	24	31.2	50.4	108	4.8
1972	12	26	28.4	52.8	109	5.0
1973	1	6	33.1	48.3	70	4.9
1973	1	6	38.0	46.7	65	4.6
1973	1	10	31.0	51.3	87	5.0
1973	1	18	32.8	48.1	87	4.9
1973	1	30	38.1	42.4	20	4.3
1973	2	7	32.0	49.3	64	5.4
1973	2	10	27.2	51.7	0	4.7
1973	3	3	29.8	51.2	57	5.3
1973	3	14	29.2	49.0	33	4.9
1973	3	19	26.7	53.5	54	4.3
1973	3	19	40.0	40.3	33	4.7
1973	4	5	30.7	50.5	70	4.7
1973	4	7	27.9	52.5	33	4.6
1973	4	19	28.2	53.5	46	4.7
1973	4	22	30.7	49.8	50	5.3
1973	5	8	28.2	53.9	0	5.0
1973	6	9	27.8	52.2	20	5.1
1973	6	9	28.2	52.1	35	5.1
1973	6	15	31.7	52.0	0	4.4
1973	6	25	30.0	50.5	48	5.2
1973	7	13	38.5	49.5	48	4.8
1973	8	15	30.9	50.3	83	4.7
1973	8	23	31.9	51.0	49	5.3
1973	8	24	27.8	52.7	64	5.1
1973	8	28	27.3	52.5	0	5.0
1973	8	30	38.0	42.7	35	5.0
1973	9	17	36.5	51.1	10	5.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1973	9	23	30.7	49.1	61	4.4
1973	10	3	34.2	47.7	44	4.2
1973	10	30	37.0	50.7	48	4.3
1973	11	5	33.0	49.5	54	4.8
1973	11	5	38.0	43.1	69	4.7
1973	11	11	30.6	53.0	33	5.7
1973	11	13	32.6	48.3	46	5.1
1973	11	20	32.0	54.6	31	5.3
1973	12	10	32.6	49.1	81	4.7
1973	12	19	28.2	55.0	54	4.7
1974	1	7	33.3	48.0	52	5.3
1974	1	9	35.4	40.1	30	4.4
1974	2	18	37.5	43.4	24	4.2
1974	3	1	31.1	51.2	89	4.6
1974	3	12	32.3	50.2	45	4.6
1974	3	12	38.5	43.9	10	4.7
1974	3	15	39.3	41.8	83	3.9
1974	4	11	29.7	51.7	51	3.9
1974	4	23	26.9	54.6	47	4.8
1974	5	4	31.9	50.6	66	5.2
1974	5	10	33.6	53.5	59	4.7
1974	5	17	31.3	51.2	45	4.9
1974	6	5	30.0	52.1	91	4.3
1974	6	18	29.7	51.8	64	4.3
1974	7	7	29.9	51.2	123	4.4
1974	7	22	28.7	52.1	0	4.4
1974	7	29	39.1	40.7	17	4.4
1974	8	2	30.5	50.7	54	5.1
1974	8	5	28.0	53.6	38	5.6
1974	8	18	32.6	48.5	33	4.2
1974	10	17	30.9	49.6	35	5.0
1974	10	17	39.9	48.7	0	4.6
1974	10	19	32.5	48.9	65	4.6
1974	10	24	31.9	48.5	0	4.8
1974	11	5	36.2	52.9	15	4.9
1974	11	17	36.6	42.7	57	4.3
1974	11	22	32.8	49.9	58	4.9
1974	11	27	33.3	46.9	39	5.1
1974	11	27	35.2	45.7	20	5.3
1974	12	11	30.3	51.5	156	3.9
1974	12	21	28.3	53.3	67	4.3
1974	12	25	32.5	49.3	50	4.3
1974	12	26	29.5	52.9	23	5.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1975	1	10	29.4	51.5	56	5.0
1975	1	10	35.0	44.5	0	4.6
1975	1	11	29.1	51.8	50	5.3
1975	1	11	30.3	51.9	141	4.2
1975	1	14	35.4	44.8	15	5.2
1975	1	29	27.9	54.0	98	4.1
1975	2	1	32.3	53.8	158	4.0
1975	2	1	33.5	53.8	155	4.1
1975	2	26	27.8	52.7	46	4.3
1975	2	27	28.1	53.2	17	4.1
1975	3	3	35.5	46.3	90	4.0
1975	3	13	37.1	50.7	27	4.7
1975	4	11	35.6	50.3	15	5.0
1975	4	24	29.5	52.1	55	4.4
1975	4	24	29.5	50.6	77	4.2
1975	4	28	33.3	54.9	29	5.6
1975	5	7	39.2	54.7	33	4.6
1975	5	9	30.2	52.1	65	5.1
1975	5	9	38.9	44.8	73	4.3
1975	5	11	30.2	52.4	33	4.3
1975	5	26	27.1	54.1	0	4.2
1975	6	13	26.9	55.0	57	5.2
1975	6	20	26.2	54.4	42	4.9
1975	7	12	39.3	43.9	53	4.3
1975	7	14	39.9	41.3	50	4.0
1975	7	18	39.0	45.7	62	4.3
1975	7	27	34.5	45.6	108	4.7
1975	8	22	27.4	52.7	75	4.3
1975	9	1	33.3	49.1	10	5.2
1975	9	6	38.6	40.8	5	6.6
1975	9	20	38.7	40.8	70	4.4
1975	9	21	31.6	51.1	28	5.6
1975	9	22	27.8	53.9	0	4.8
1975	10	6	38.1	48.3	59	4.6
1975	11	6	36.0	53.2	6	4.9
1975	11	18	28.9	53.0	64	4.6
1975	11	18	31.4	49.9	33	4.6
1975	11	28	38.4	40.3	51	3.9
1975	11	30	32.0	54.6	42	4.4
1976	1	2	28.5	49.0	33	5.1
1976	1	7	38.8	40.3	62	4.3
1976	1	12	38.6	43.1	25	5.2
1976	1	13	38.6	40.7	68	4.6

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1976	1	16	30.2	50.9	48	5.0
1976	2	3	39.9	48.3	57	5.6
1976	2	15	32.1	49.0	37	4.6
1976	2	20	30.6	50.4	49	5.0
1976	3	6	33.1	48.5	77	4.7
1976	3	7	26.0	54.8	33	4.1
1976	3	16	27.3	55.0	36	5.8
1976	4	2	39.8	43.7	25	4.9
1976	4	5	28.1	52.0	61	4.4
1976	4	12	31.1	51.3	60	4.4
1976	4	21	33.7	47.0	50	5.0
1976	4	22	28.8	52.1	33	5.8
1976	4	23	31.4	49.9	48	4.4
1976	6	1	37.5	54.5	34	4.7
1976	6	2	28.3	53.5	70	5.1
1976	6	10	32.0	49.7	46	4.4
1976	6	27	29.5	52.1	28	4.8
1976	6	29	30.6	51.3	33	4.3
1976	7	17	29.8	51.5	41	4.9
1976	8	10	30.4	50.4	85	4.4
1976	9	2	25.0	52.7	33	4.2
1976	9	5	31.4	50.0	53	5.4
1976	9	6	31.1	50.5	60	5.2
1976	9	10	31.7	51.0	129	3.9
1976	9	14	28.0	53.5	36	5.1
1976	9	26	29.9	47.3	33	3.6
1976	9	27	28.9	48.2	33	4.0
1976	10	11	27.1	53.4	54	4.7
1976	10	15	30.1	52.0	3	5.4
1976	10	16	32.9	47.2	77	4.4
1976	11	7	33.2	47.9	61	5.9
1976	11	24	39.1	44.0	10	7.2
1976	11	24	39.1	44.2	66	5.9
1976	11	24	39.5	45.0	33	4.6
1976	11	24	39.6	43.7	43	4.8
1976	12	11	33.7	46.6	49	5.3
1976	12	23	28.2	54.3	58	4.7
1977	1	7	31.0	50.6	99	4.4
1977	1	29	28.4	53.3	44	4.9
1977	2	12	32.4	49.1	38	4.4
1977	2	14	27.3	52.9	33	4.9
1977	2	21	39.9	40.1	33	5.1
1977	2	25	32.6	49.4	66	5.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1977	3	16	31.1	52.5	33	4.3
1977	3	22	29.5	51.4	43	5.2
1977	3	25	38.7	40.1	17	5.3
1977	3	31	28.1	52.2	41	5.4
1977	4	6	32.0	50.7	16	6.0
1977	4	26	32.7	48.9	52	5.8
1977	5	19	29.8	51.2	39	5.1
1977	5	25	29.3	53.4	36	5.1
1977	5	25	34.9	52.1	39	5.7
1977	6	5	32.1	47.9	33	4.8
1977	6	5	32.4	48.1	59	4.3
1977	6	5	32.6	48.1	10	6.1
1977	6	10	28.6	52.2	0	5.1
1977	7	8	39.6	41.2	53	4.6
1977	7	14	26.9	53.6	51	5.1
1977	8	13	39.9	54.6	8	4.6
1977	9	16	30.1	51.5	34	4.9
1977	10	19	27.8	54.9	33	6.0
1977	10	26	31.5	51.2	52	5.0
1977	10	27	29.7	50.7	34	5.2
1977	12	11	34.6	47.2	33	4.4
1978	1	5	27.5	53.8	49	4.9
1978	1	5	33.7	54.8	33	4.7
1978	1	6	29.7	52.3	33	4.4
1978	1	8	30.4	50.8	44	5.0
1978	1	17	39.4	41.4	139	4.9
1978	1	19	32.6	48.3	72	4.6
1978	2	15	39.8	40.0	54	4.9
1978	2	16	32.1	54.3	47	4.6
1978	3	2	37.2	54.5	58	4.9
1978	3	23	27.3	53.3	33	4.8
1978	3	30	30.8	49.6	33	4.4
1978	3	31	30.5	50.1	33	4.7
1978	5	3	31.6	49.7	10	4.7
1978	5	9	29.8	52.7	33	4.4
1978	5	11	28.1	54.1	45	4.7
1978	5	18	39.8	54.8	35	5.2
1978	5	20	31.8	50.5	133	5.3
1978	6	3	27.9	53.4	0	4.6
1978	6	22	33.0	47.8	33	4.3
1978	6	27	29.2	53.3	33	4.1
1978	7	3	31.5	51.0	37	4.6
1978	7	24	33.1	48.7	55	4.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1978	7	27	30.0	50.8	33	4.6
1978	7	28	29.8	52.2	21	4.3
1978	7	28	31.3	49.8	54	4.4
1978	8	10	34.2	47.9	47	4.4
1978	8	11	26.9	53.6	88	4.2
1978	8	11	31.8	51.0	72	4.6
1978	8	13	39.3	41.1	128	4.6
1978	8	28	32.6	49.8	44	4.9
1978	8	29	29.7	51.6	41	5.0
1978	9	8	29.0	51.4	33	4.3
1978	9	13	28.4	54.4	33	4.0
1978	9	16	32.8	46.0	33	4.8
1978	9	16	38.6	47.6	33	4.3
1978	9	20	31.1	49.4	33	4.8
1978	10	7	35.6	45.7	33	4.3
1978	10	12	27.5	52.9	57	4.4
1978	11	6	33.2	55.0	46	5.0
1978	11	25	39.9	44.1	10	4.5
1978	11	30	30.6	50.7	33	4.7
1978	12	14	32.1	49.6	17	6.1
1978	12	14	32.7	50.2	0	4.6
1978	12	24	33.9	50.9	0	4.2
1979	1	1	37.6	50.2	33	4.2
1979	1	31	31.4	54.7	33	4.7
1979	2	15	32.7	49.8	33	4.6
1979	2	22	35.2	52.1	33	4.9
1979	3	18	36.3	52.7	33	4.7
1979	3	21	31.6	49.6	33	4.5
1979	3	22	31.4	50.6	33	4.3
1979	3	25	34.9	52.5	48	4.6
1979	3	28	30.9	50.0	59	5.3
1979	4	8	30.1	51.7	33	4.8
1979	4	11	30.8	50.4	33	4.3
1979	4	11	39.3	41.5	89	4.3
1979	4	18	33.4	46.5	66	4.9
1979	5	15	28.4	51.4	33	4.7
1979	5	16	32.6	47.8	33	4.7
1979	5	26	29.7	50.3	47	4.6
1979	6	2	32.6	49.7	38	4.9
1979	6	14	26.7	54.9	33	4.8
1979	6	26	30.9	49.6	33	4.6
1979	7	1	34.8	46.2	50	4.6
1979	7	23	28.1	54.0	0	4.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1979	8	15	30.5	50.7	33	4.6
1979	8	19	30.4	51.0	54	4.7
1979	8	19	31.2	50.2	86	4.7
1979	8	26	31.6	49.2	0	4.7
1979	9	4	39.9	43.9	50	4.8
1979	9	17	29.5	52.5	37	4.5
1979	9	18	30.5	54.6	33	4.4
1979	9	21	29.2	52.7	48	4.7
1979	9	24	31.7	51.6	33	4.2
1979	9	30	27.2	52.1	33	4.2
1979	9	30	27.4	54.9	33	4.1
1979	9	30	27.9	54.8	62	4.9
1979	10	4	31.2	50.2	33	4.6
1979	10	16	32.9	48.7	33	4.3
1979	10	17	29.5	51.6	33	4.3
1979	11	8	38.7	48.9	33	4.8
1979	11	12	31.1	51.3	157	4.4
1979	11	21	32.6	48.8	64	4.9
1979	11	21	38.2	47.2	41	4.8
1979	11	23	38.7	49.1	67	4.8
1979	11	25	26.3	54.4	52	4.5
1979	12	7	34.0	54.8	31	6.0
1979	12	9	30.3	48.0	33	4.2
1979	12	11	30.8	50.4	33	4.5
1979	12	21	37.3	53.3	0	4.6
1979	12	24	29.1	52.1	3	5.0
1979	12	30	38.5	42.6	33	4.3
1980	1	3	31.8	50.5	66	4.8
1980	1	11	26.3	54.3	15	4.7
1980	1	13	37.1	50.4	23	5.2
1980	2	6	26.8	53.9	49	5.1
1980	2	7	28.0	53.4	44	4.8
1980	2	9	30.1	51.5	33	4.6
1980	2	19	39.1	48.8	43	5.2
1980	2	21	32.6	47.5	63	5.2
1980	2	25	32.3	49.4	86	4.3
1980	2	26	27.4	53.6	60	5.0
1980	3	8	26.9	52.8	33	4.4
1980	3	15	29.8	51.1	33	4.7
1980	3	25	39.0	45.6	55	4.7
1980	3	31	33.4	48.4	36	4.9
1980	4	5	32.1	48.3	33	4.6
1980	4	30	39.6	40.2	33	4.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1980	5	4	38.1	49.2	15	6.5
1980	5	16	38.9	45.9	15	4.5
1980	6	1	30.4	52.2	0	4.2
1980	6	30	27.7	52.4	33	4.6
1980	7	6	34.3	48.7	33	4.4
1980	7	11	38.5	40.8	56	4.8
1980	7	16	29.6	51.8	70	4.8
1980	7	22	37.3	50.3	25	5.6
1980	8	1	39.9	54.6	33	4.2
1980	8	5	40.0	52.2	45	4.3
1980	8	12	29.5	52.7	43	4.4
1980	8	22	27.2	54.9	19	4.5
1980	8	25	33.8	48.4	33	4.8
1980	8	27	36.9	48.8	46	4.3
1980	9	6	32.6	48.1	33	4.7
1980	9	15	33.9	48.9	33	4.5
1980	9	19	39.9	51.1	57	4.5
1980	10	5	33.1	48.2	173	4.4
1980	10	10	38.4	45.9	47	4.3
1980	10	15	29.4	51.7	37	4.9
1980	10	18	39.9	40.3	40	4.9
1980	10	19	32.7	48.6	23	5.8
1980	10	22	32.3	48.7	150	4.6
1980	10	23	32.7	48.7	144	4.6
1980	11	10	31.0	49.2	0	4.6
1980	11	12	28.5	52.4	75	4.6
1980	11	22	28.0	52.1	35	4.8
1980	11	27	32.6	49.9	64	4.4
1980	12	14	29.2	50.9	54	4.9
1980	12	14	33.3	46.7	142	4.7
1980	12	18	35.9	44.6	15	6.2
1980	12	18	36.0	44.1	0	4.9
1980	12	19	34.5	50.7	13	6.2
1980	12	19	35.3	52.4	0	4.8
1980	12	20	36.0	45.4	0	4.6
1980	12	27	30.2	50.6	33	4.6
1980	12	29	38.6	45.0	66	4.8
1981	1	4	38.5	44.9	15	4.6
1981	1	18	29.0	52.3	57	4.2
1981	1	25	26.4	53.9	0	4.6
1981	1	28	27.7	53.6	42	4.6
1981	2	19	32.4	49.3	54	4.7
1981	3	13	32.9	48.7	79	4.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1981	3	21	28.1	53.2	64	4.9
1981	3	26	26.7	54.0	33	4.6
1981	3	28	39.7	44.9	3	4.1
1981	4	1	29.8	51.5	41	4.9
1981	4	13	39.9	40.7	52	4.7
1981	4	18	29.2	52.2	28	4.5
1981	4	18	31.5	49.3	0	4.4
1981	4	27	37.3	54.7	41	4.3
1981	4	29	37.4	44.9	0	4.7
1981	5	1	33.1	54.0	38	4.7
1981	5	4	34.3	45.7	53	4.7
1981	5	20	28.2	51.8	40	4.9
1981	5	23	31.4	50.9	33	4.6
1981	5	24	38.6	45.4	15	4.5
1981	6	21	28.6	53.2	33	4.1
1981	6	28	33.5	45.4	119	4.8
1981	7	6	35.3	44.7	31	4.9
1981	7	15	33.6	46.7	33	4.7
1981	7	15	33.9	45.3	87	4.9
1981	7	21	39.5	53.3	38	5.4
1981	7	23	37.1	45.2	15	5.9
1981	7	23	37.3	45.4	79	4.8
1981	8	4	36.5	51.3	0	5.0
1981	8	5	38.5	49.7	33	4.7
1981	9	2	36.3	44.3	33	4.3
1981	9	5	35.8	44.2	62	4.8
1981	9	6	28.2	52.8	33	4.3
1981	9	6	29.6	54.1	0	4.4
1981	9	13	27.5	53.9	71	4.9
1981	10	9	36.6	45.2	33	5.1
1981	10	27	30.8	48.4	33	4.9
1981	10	30	38.9	49.9	0	4.2
1981	11	17	33.1	47.4	42	4.8
1981	11	28	30.8	50.6	73	5.2
1981	12	24	33.0	49.6	53	4.7
1981	12	28	35.0	45.9	62	5.6
1982	1	1	37.2	42.6	35	5.1
1982	1	3	31.8	50.4	33	4.3
1982	1	9	36.4	54.5	33	4.4
1982	1	13	29.9	52.1	33	4.8
1982	1	25	26.6	54.8	0	4.2
1982	1	28	37.2	43.6	33	4.6
1982	2	5	32.1	49.7	41	4.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1982	2	5	36.1	53.7	33	4.8
1982	2	13	29.1	51.3	45	4.3
1982	2	20	30.3	50.6	92	5.1
1982	3	4	27.9	53.1	70	4.7
1982	3	7	37.7	50.0	66	4.6
1982	3	8	28.2	55.0	33	4.4
1982	3	12	34.0	48.2	18	4.7
1982	3	13	30.8	47.9	0	4.6
1982	3	20	27.6	52.8	57	4.9
1982	3	23	39.5	41.8	10	4.9
1982	3	27	39.2	41.9	35	5.4
1982	4	17	28.6	51.8	48	4.9
1982	4	21	36.1	44.0	33	4.6
1982	4	25	32.7	48.1	33	4.8
1982	4	27	39.1	46.3	23	4.4
1982	4	30	33.3	46.0	68	4.8
1982	5	15	35.5	54.1	15	4.8
1982	5	19	39.9	42.2	35	5.0
1982	5	29	39.3	43.7	15	5.0
1982	6	1	33.7	48.2	53	4.7
1982	7	1	34.6	47.7	46	4.3
1982	7	13	30.5	49.6	33	4.4
1982	7	15	29.7	50.7	32	4.4
1982	8	3	37.5	50.9	33	4.6
1982	8	15	31.5	49.6	33	5.0
1982	8	22	33.3	54.9	31	4.5
1982	9	1	33.6	48.9	50	4.4
1982	9	5	31.7	50.2	37	4.5
1982	9	19	27.8	54.8	33	4.1
1982	9	28	31.0	50.0	33	4.7
1982	10	5	27.6	53.3	33	4.7
1982	10	10	31.6	49.0	33	4.7
1982	10	18	31.3	50.9	33	4.2
1982	10	18	33.2	48.6	83	4.9
1982	10	21	28.5	52.1	50	4.5
1982	10	25	35.1	52.3	15	4.8
1982	11	4	38.6	45.5	33	4.3
1982	11	10	26.7	55.0	33	5.0
1982	11	11	32.1	49.4	33	4.9
1982	11	26	28.9	51.5	33	4.7
1982	12	9	38.4	40.6	40	4.8
1982	12	14	39.9	54.8	20	4.8
1983	1	1	30.3	50.8	52	5.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1983	1	1	39.5	40.4	33	4.8
1983	1	7	36.1	41.1	45	5.0
1983	1	15	34.0	47.1	10	5.1
1983	1	31	32.6	46.8	33	5.1
1983	2	18	27.9	53.8	53	5.1
1983	3	5	32.5	49.3	39	5.5
1983	3	7	35.1	46.0	33	4.7
1983	3	11	34.3	46.1	33	4.8
1983	3	14	39.3	54.5	10	5.7
1983	3	25	36.0	52.3	16	5.5
1983	3	26	38.7	44.2	15	4.9
1983	4	2	39.0	48.7	15	5.0
1983	4	6	39.9	40.4	44	4.7
1983	4	15	30.7	50.3	50	5.0
1983	4	28	29.5	51.0	33	4.6
1983	5	9	35.3	44.4	68	5.1
1983	5	12	39.5	52.5	56	4.9
1983	5	21	29.4	51.4	33	4.1
1983	5	22	31.5	48.8	33	4.6
1983	5	28	32.6	48.6	43	5.3
1983	5	28	32.9	48.9	69	4.8
1983	5	29	35.2	52.1	15	4.7
1983	5	30	28.7	54.7	33	4.1
1983	6	1	29.0	51.6	33	4.4
1983	6	20	39.8	42.1	10	4.4
1983	7	9	31.5	51.2	140	4.3
1983	7	11	29.1	52.0	57	4.9
1983	7	22	37.0	49.2	20	5.4
1983	8	1	32.1	47.3	81	4.9
1983	8	3	38.9	44.7	33	4.5
1983	8	7	39.8	54.0	40	5.4
1983	8	11	39.0	44.2	40	4.6
1983	8	13	28.3	53.3	37	4.7
1983	8	17	31.8	50.8	45	5.2
1983	8	24	33.4	49.0	33	4.8
1983	8	27	38.7	41.0	0	4.8
1983	9	13	34.4	46.5	33	4.9
1983	9	23	30.8	50.3	42	4.8
1983	10	3	37.2	43.6	48	5.0
1983	10	8	28.1	54.5	33	4.4
1983	10	14	30.8	54.3	33	4.1
1983	11	17	31.6	47.4	41	5.0
1983	11	19	34.3	46.0	44	4.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1983	12	2	39.6	45.0	0	4.4
1983	12	5	30.1	50.9	0	4.1
1983	12	9	32.9	48.3	0	4.8
1983	12	20	36.9	50.9	15	5.1
1983	12	21	36.9	51.3	33	4.7
1983	12	22	31.3	48.7	0	4.4
1983	12	26	33.8	48.9	68	4.8
1984	1	14	32.6	49.2	83	4.7
1984	1	19	28.8	52.1	33	4.3
1984	1	29	32.6	48.1	33	5.1
1984	2	2	27.4	52.1	33	4.6
1984	2	18	27.7	51.2	0	4.6
1984	2	22	39.4	54.0	41	5.8
1984	3	1	27.3	53.9	44	5.1
1984	3	7	39.0	43.3	30	4.5
1984	3	18	37.8	49.4	33	4.4
1984	3	21	26.9	54.3	60	5.2
1984	3	23	30.7	50.3	33	4.4
1984	3	25	38.3	45.3	33	4.9
1984	3	26	34.3	45.4	75	5.0
1984	4	2	37.6	42.9	43	4.7
1984	4	30	27.4	53.1	33	3.8
1984	5	11	36.6	54.9	25	5.2
1984	6	1	31.9	50.5	52	4.8
1984	6	2	31.5	50.4	33	4.6
1984	6	22	31.2	49.8	33	5.0
1984	7	22	27.7	55.0	35	4.1
1984	7	23	29.5	53.4	43	5.2
1984	7	28	39.4	40.3	33	4.5
1984	7	31	31.4	51.3	103	4.8
1984	8	2	27.3	51.2	33	4.4
1984	8	2	28.1	51.3	39	5.2
1984	8	8	34.5	47.9	33	4.9
1984	8	11	38.3	46.9	10	3.9
1984	8	23	36.3	43.0	15	4.9
1984	8	24	38.5	46.0	10	5.4
1984	8	28	30.8	51.4	68	5.2
1984	9	6	26.2	54.4	27	5.2
1984	9	9	35.5	49.3	50	4.9
1984	9	21	29.9	50.3	62	5.1
1984	9	23	36.4	44.7	54	4.9
1984	9	28	31.6	44.8	33	5.0
1984	9	30	37.9	49.2	59	4.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1984	10	3	36.1	45.2	33	4.8
1984	10	21	32.7	47.5	50	5.3
1984	10	28	27.7	53.7	71	4.3
1984	10	28	37.0	45.3	33	4.9
1984	11	23	31.4	49.7	36	4.7
1984	11	30	33.1	53.4	0	4.3
1984	12	3	38.0	43.1	10	5.3
1984	12	22	27.9	54.5	39	5.0
1984	12	27	34.8	45.4	92	4.6
1984	12	27	34.8	45.1	60	4.6
1985	1	14	39.9	53.6	33	4.7
1985	2	2	28.4	53.0	44	5.5
1985	2	5	29.0	52.8	0	4.7
1985	2	5	39.7	49.1	51	4.4
1985	2	7	30.1	50.6	0	4.1
1985	2	8	39.4	54.7	33	4.8
1985	2	11	34.5	50.7	62	5.0
1985	2	16	36.8	51.8	33	4.6
1985	2	16	39.8	41.8	35	4.6
1985	2	20	37.6	48.0	0	4.6
1985	2	26	32.3	47.8	0	5.0
1985	3	6	30.3	50.5	33	4.4
1985	3	12	33.3	49.4	63	4.8
1985	3	13	32.1	49.5	0	5.0
1985	3	17	34.5	45.4	70	4.8
1985	3	27	31.6	49.9	41	5.1
1985	3	27	39.3	53.6	32	4.5
1985	3	28	32.4	50.2	63	4.7
1985	4	3	38.0	48.4	10	4.6
1985	4	9	39.3	46.6	33	4.4
1985	4	18	39.6	44.6	0	4.7
1985	4	19	28.3	53.8	52	4.7
1985	4	20	29.3	53.3	43	4.6
1985	4	20	35.8	46.4	110	4.2
1985	4	25	29.4	52.8	28	5.1
1985	5	9	39.0	49.0	33	4.7
1985	5	19	29.7	51.1	44	5.0
1985	5	31	30.1	51.7	45	4.4
1985	7	5	30.8	50.5	76	4.4
1985	7	8	36.3	53.7	33	5.0
1985	7	23	30.4	50.6	42	5.2
1985	7	24	35.9	46.0	10	4.3
1985	7	27	33.0	46.3	55	5.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1985	7	31	28.8	52.3	33	5.1
1985	8	7	27.6	52.3	0	5.1
1985	8	7	27.9	53.1	40	5.6
1985	8	19	29.0	53.1	33	4.6
1985	8	19	29.2	52.3	33	4.6
1985	9	10	28.0	53.8	33	4.7
1985	9	11	33.1	47.5	33	5.3
1985	9	18	31.6	49.5	33	5.1
1985	9	22	33.0	48.1	33	4.7
1985	10	10	26.8	55.0	37	5.1
1985	10	14	35.6	52.7	15	4.9
1985	10	29	36.5	54.7	60	4.8
1985	10	29	36.9	54.9	14	6.2
1985	10	30	36.2	44.9	10	4.7
1985	11	2	37.8	49.5	33	4.7
1985	11	15	28.1	51.3	22	4.9
1985	11	23	33.5	48.9	44	4.7
1985	12	5	29.6	51.6	33	4.8
1985	12	10	28.1	53.5	53	4.0
1985	12	11	35.8	45.6	48	5.0
1985	12	29	38.7	44.5	33	4.6
1985	12	31	27.8	54.5	66	5.0
1986	1	1	39.1	41.8	35	4.7
1986	1	3	35.1	44.6	0	4.2
1986	1	27	28.5	51.5	46	5.1
1986	1	27	38.9	48.7	25	4.9
1986	2	8	27.2	54.2	33	4.0
1986	3	8	31.0	50.3	64	4.8
1986	3	12	39.7	40.1	10	4.1
1986	3	15	29.9	50.4	33	4.4
1986	3	15	32.4	47.0	33	5.1
1986	3	16	29.7	52.8	33	4.6
1986	3	23	28.9	51.6	33	4.1
1986	3	25	26.8	54.9	38	5.6
1986	3	25	39.9	53.9	33	5.1
1986	3	26	35.1	48.0	33	4.6
1986	3	26	36.0	53.7	34	4.9
1986	3	30	39.0	44.6	49	4.4
1986	4	10	34.4	54.4	33	4.9
1986	4	11	40.0	43.4	15	4.5
1986	4	24	28.4	53.2	33	4.6
1986	4	29	37.9	49.1	25	5.2
1986	5	11	37.0	45.3	42	4.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1986	5	17	31.9	50.9	68	4.9
1986	5	19	37.9	43.1	10	4.4
1986	5	20	31.3	51.6	33	4.6
1986	5	26	29.0	51.8	10	4.8
1986	5	30	34.9	44.4	5	4.6
1986	6	2	32.0	50.2	62	5.2
1986	6	2	35.9	45.6	15	5.0
1986	6	9	39.0	48.7	33	4.3
1986	6	29	30.6	50.0	33	4.6
1986	7	12	29.9	51.6	1	5.7
1986	7	12	30.0	50.7	10	4.7
1986	7	12	38.4	45.2	15	5.1
1986	7	28	28.3	52.0	33	3.8
1986	7	29	36.5	45.4	17	4.8
1986	8	10	38.6	43.6	20	4.5
1986	8	11	30.2	52.1	33	4.6
1986	8	18	35.9	44.4	38	5.2
1986	8	25	36.8	44.8	10	4.7
1986	8	28	39.5	46.3	33	4.8
1986	8	30	28.1	54.5	33	4.4
1986	9	10	36.1	49.1	33	4.4
1986	10	1	29.0	51.4	10	4.8
1986	10	2	38.9	40.3	9	4.6
1986	10	6	29.6	54.8	33	3.8
1986	10	16	29.0	52.7	10	5.0
1986	11	4	31.1	49.9	33	4.6
1986	11	5	39.0	49.0	39	4.8
1986	11	12	34.4	46.4	0	4.8
1986	11	20	34.8	45.4	66	4.7
1986	12	11	27.7	53.2	33	4.4
1986	12	14	27.5	54.4	12	5.1
1986	12	16	32.6	46.7	33	5.1
1986	12	17	36.0	43.7	33	4.7
1986	12	21	33.0	49.9	33	4.6
1987	1	12	28.6	52.2	39	4.3
1987	1	20	32.0	50.7	33	4.9
1987	1	21	32.7	47.7	54	5.0
1987	1	22	29.3	51.6	25	4.6
1987	2	22	38.4	40.5	39	5.3
1987	3	11	33.1	46.3	67	4.7
1987	3	12	31.3	50.1	78	4.8
1987	3	27	32.5	50.0	33	4.4
1987	3	28	29.4	52.5	20	4.4

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1987	4	12	38.2	48.7	33	4.1
1987	4	13	28.5	50.8	10	4.6
1987	4	22	27.1	54.1	33	3.9
1987	4	26	28.3	52.0	44	4.3
1987	5	14	39.9	40.1	44	4.6
1987	5	22	32.0	47.3	33	4.3
1987	5	23	34.1	46.5	33	4.7
1987	5	29	34.0	48.3	48	5.1
1987	6	1	30.9	50.0	49	4.8
1987	6	13	28.4	54.9	33	4.1
1987	6	18	28.5	54.3	44	4.8
1987	7	12	34.9	46.9	51	4.9
1987	7	13	39.1	43.5	10	4.3
1987	7	14	28.3	50.7	10	4.4
1987	7	16	28.5	51.7	39	4.3
1987	7	16	29.2	50.5	10	4.4
1987	7	16	29.7	50.7	44	4.9
1987	7	22	37.9	46.8	10	4.5
1987	8	6	34.0	48.5	10	3.9
1987	8	30	32.2	48.5	22	4.6
1987	8	31	32.7	49.2	33	4.2
1987	9	6	39.2	40.5	10	4.4
1987	9	7	39.4	54.8	31	5.7
1987	9	9	33.7	47.1	66	5.0
1987	9	21	28.9	51.1	33	4.4
1987	9	22	33.7	48.1	33	4.3
1987	9	29	28.5	52.8	39	5.4
1987	10	7	30.9	51.2	41	4.6
1987	10	13	27.9	54.5	33	4.6
1987	10	18	36.0	46.8	33	4.4
1987	11	3	28.4	50.5	10	4.7
1987	11	7	34.1	48.0	33	4.1
1987	11	9	32.8	47.8	39	5.0
1987	11	20	29.2	51.9	33	4.0
1987	11	25	35.7	53.1	33	4.7
1987	11	28	36.0	45.6	10	4.3
1987	12	5	33.5	49.1	10	4.6
1987	12	7	38.1	43.1	15	4.7
1988	1	7	38.4	45.4	15	5.1
1988	1	11	32.0	48.5	10	4.6
1988	1	13	37.3	54.4	15	5.2
1988	1	14	29.6	50.5	48	4.7
1988	1	15	30.5	50.8	69	4.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1988	1	17	33.4	47.6	33	4.7
1988	1	19	32.3	48.0	10	4.3
1988	1	19	34.0	48.4	33	4.3
1988	1	25	33.0	49.4	33	4.1
1988	1	26	32.5	46.6	48	5.1
1988	1	26	32.7	47.1	40	5.6
1988	1	27	39.8	45.1	15	4.8
1988	1	28	28.0	53.9	27	5.0
1988	1	29	34.6	46.3	33	5.0
1988	1	30	31.2	51.4	33	4.7
1988	2	11	27.6	54.8	33	4.4
1988	2	13	29.2	51.9	33	4.3
1988	2	16	28.4	53.3	33	4.0
1988	2	17	27.8	54.3	44	4.9
1988	2	19	33.4	47.3	83	4.8
1988	2	22	27.3	53.3	36	4.9
1988	3	1	34.5	50.8	16	4.8
1988	3	30	30.9	50.2	29	5.9
1988	3	30	39.2	40.3	10	4.2
1988	4	4	39.8	40.4	10	3.7
1988	4	7	38.9	45.3	33	4.1
1988	4	8	30.1	51.2	182	4.3
1988	4	9	38.9	40.5	10	4.4
1988	4	10	28.0	52.9	38	4.2
1988	4	16	32.2	49.2	29	4.8
1988	4	20	39.1	44.1	15	5.5
1988	5	3	32.0	49.7	60	5.1
1988	5	21	31.2	50.6	33	4.3
1988	5	27	34.4	50.3	10	4.8
1988	5	30	28.6	51.4	51	4.5
1988	6	4	37.0	45.3	15	5.3
1988	6	6	29.8	51.1	36	4.8
1988	6	8	35.5	44.9	10	4.3
1988	6	25	38.5	43.1	15	5.5
1988	6	27	34.3	46.2	33	4.6
1988	6	29	33.7	48.4	10	4.4
1988	7	6	29.3	52.5	21	4.9
1988	7	8	36.8	44.0	10	4.7
1988	7	13	33.0	47.1	79	5.1
1988	7	22	34.1	46.6	33	4.9
1988	7	22	38.9	45.5	33	4.2
1988	7	25	32.9	48.3	33	5.1
1988	7	25	36.0	45.7	15	5.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1988	8	11	29.9	51.7	15	6.1
1988	8	14	31.7	50.4	33	4.4
1988	8	22	35.3	52.3	25	5.3
1988	9	1	32.5	48.6	33	4.6
1988	9	17	29.0	54.3	33	4.4
1988	9	25	28.3	53.1	85	4.1
1988	10	3	39.6	40.1	10	4.4
1988	10	8	28.0	54.2	66	4.3
1988	10	16	38.0	44.8	33	4.8
1988	10	31	28.2	54.9	33	4.1
1988	11	4	34.4	54.6	33	5.1
1988	11	17	27.6	52.9	33	4.6
1988	12	3	34.5	53.1	33	5.0
1988	12	7	29.6	51.1	56	4.6
1988	12	19	35.4	46.0	9	4.9
1988	12	21	30.1	50.5	33	4.8
1988	12	27	31.7	47.5	33	5.0
1989	1	1	27.2	54.2	35	4.8
1989	1	8	38.8	40.8	10	4.6
1989	1	13	27.8	54.2	62	5.0
1989	2	15	37.3	50.4	15	5.0
1989	3	1	31.6	49.5	19	4.7
1989	3	2	35.1	46.3	33	4.6
1989	3	3	33.9	48.1	10	4.9
1989	3	15	31.9	50.7	69	4.9
1989	3	22	27.4	53.3	71	3.9
1989	4	2	32.6	47.8	33	5.3
1989	4	9	36.6	42.2	33	4.8
1989	4	12	31.3	49.9	33	4.4
1989	4	26	34.6	45.7	33	4.4
1989	5	2	35.6	44.3	10	4.1
1989	5	8	34.9	44.7	49	4.6
1989	5	20	38.9	40.0	15	5.4
1989	5	20	39.6	40.2	39	5.4
1989	5	27	30.2	50.9	29	6.0
1989	5	30	28.9	52.0	16	4.4
1989	6	2	31.9	49.9	10	4.3
1989	6	2	33.2	48.1	33	4.3
1989	6	4	38.8	45.3	33	3.8
1989	6	9	32.1	51.7	33	4.8
1989	6	12	35.0	46.3	33	4.8
1989	6	23	32.0	54.4	33	4.2
1989	6	26	28.5	51.4	19	4.6

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1989	7	11	31.6	49.6	10	4.3
1989	7	17	31.4	49.6	39	4.9
1989	7	18	30.9	49.7	36	4.7
1989	7	27	32.3	49.0	63	5.2
1989	7	28	35.6	45.4	30	5.1
1989	8	7	26.6	54.8	10	3.9
1989	8	21	27.8	54.2	10	4.1
1989	9	13	37.2	54.2	30	4.9
1989	9	16	39.7	51.0	33	5.2
1989	10	1	30.9	51.4	42	4.9
1989	10	8	37.2	50.2	57	4.9
1989	10	10	33.4	48.7	55	4.9
1989	11	9	29.0	51.2	10	4.6
1989	11	25	31.9	53.6	10	4.3
1989	12	2	38.5	45.4	20	4.8
1989	12	11	28.7	51.3	33	4.3
1989	12	12	29.1	52.6	10	4.4
1989	12	16	33.1	48.6	0	4.6
1989	12	22	29.4	51.4	33	4.1
1989	12	27	32.5	47.6	45	5.3
1990	1	5	29.4	52.1	19	4.4
1990	1	6	27.9	52.1	58	4.7
1990	1	8	29.8	50.5	20	4.4
1990	1	16	33.3	46.9	57	5.2
1990	1	20	35.9	53.0	32	6.0
1990	1	25	27.4	54.4	10	4.1
1990	2	2	32.5	49.2	33	4.2
1990	2	8	33.1	47.2	89	4.9
1990	2	16	35.9	54.6	25	5.1
1990	2	19	33.9	46.6	52	5.2
1990	2	20	32.6	44.2	37	4.9
1990	3	5	38.2	40.6	26	4.4
1990	3	16	32.5	48.5	57	4.8
1990	3	21	33.5	54.4	17	5.1
1990	3	23	29.6	51.3	33	4.9
1990	3	30	32.5	52.8	33	4.4
1990	4	1	35.1	45.5	33	3.8
1990	4	14	27.5	53.5	64	4.3
1990	4	18	30.7	51.6	33	4.0
1990	4	20	40.0	40.1	40	5.4
1990	5	7	31.0	51.7	22	5.1
1990	5	21	31.5	50.9	33	4.3
1990	5	24	29.7	50.2	33	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1990	5	24	32.9	46.8	53	5.2
1990	6	11	32.3	48.7	34	4.7
1990	6	20	37.0	49.3	12	7.4
1990	6	20	37.6	48.7	33	5.0
1990	6	20	37.6	49.7	33	5.5
1990	6	23	37.4	50.1	10	4.7
1990	6	24	32.4	50.0	52	4.9
1990	6	24	36.1	48.9	15	5.3
1990	6	27	28.4	51.2	33	4.3
1990	6	30	36.9	50.2	33	4.7
1990	7	7	31.8	54.4	33	4.2
1990	7	29	29.6	51.0	33	4.3
1990	7	31	32.3	47.2	66	4.3
1990	8	1	27.9	53.4	33	4.9
1990	8	2	38.7	48.2	33	4.3
1990	8	3	32.8	48.2	44	5.2
1990	8	4	32.9	47.8	69	4.7
1990	8	9	32.7	47.6	60	4.7
1990	8	31	26.9	54.0	33	4.9
1990	8	31	27.3	53.9	48	4.8
1990	9	24	38.2	48.2	10	4.9
1990	9	28	27.5	54.5	33	4.0
1990	10	7	27.4	53.2	94	4.7
1990	10	12	35.0	47.8	33	4.6
1990	10	18	27.3	53.0	33	4.7
1990	10	25	28.3	54.2	40	4.7
1990	10	26	28.4	52.5	15	4.7
1990	10	26	29.7	50.8	44	4.8
1990	10	31	36.6	54.7	33	4.6
1990	11	5	27.0	53.4	10	4.7
1990	12	16	29.0	51.3	16	5.7
1990	12	20	33.9	47.3	33	4.3
1990	12	28	32.4	46.9	55	5.1
1990	12	29	26.6	54.8	29	4.7
1990	12	29	32.6	47.9	67	5.4
1990	12	30	32.2	49.1	79	4.7
1991	1	1	39.8	48.5	55	5.3
1991	1	22	35.4	52.3	33	4.8
1991	2	2	37.2	42.6	21	5.2
1991	2	14	30.3	50.8	47	5.1
1991	2	14	34.3	46.2	60	5.1
1991	2	16	32.5	49.6	59	4.3
1991	2	21	29.8	51.9	27	4.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1991	2	27	30.8	47.8	33	4.4
1991	2	27	33.1	48.9	33	4.8
1991	3	10	31.8	50.2	39	4.9
1991	4	6	27.7	52.0	33	4.7
1991	4	18	29.5	52.5	33	4.3
1991	4	24	39.6	41.2	35	4.9
1991	4	28	28.4	51.5	34	3.8
1991	5	6	31.0	49.8	38	4.8
1991	5	7	30.8	52.7	33	4.0
1991	5	9	33.8	46.1	71	4.4
1991	5	18	33.6	48.4	33	4.2
1991	5	19	28.9	52.2	53	4.7
1991	5	22	28.1	54.2	23	5.1
1991	5	29	26.7	54.1	33	4.1
1991	5	29	27.1	53.6	49	4.9
1991	6	2	37.3	48.3	33	4.2
1991	6	7	30.2	53.4	33	3.9
1991	6	10	31.0	52.0	33	4.6
1991	6	19	33.8	47.1	54	4.9
1991	7	7	33.2	48.3	50	4.6
1991	7	21	36.8	45.2	36	4.6
1991	7	24	36.6	44.1	20	5.5
1991	8	10	39.9	42.1	10	4.4
1991	8	12	27.7	54.5	53	4.8
1991	8	15	39.1	41.0	33	3.9
1991	8	23	36.0	53.3	42	5.0
1991	9	5	39.0	41.6	49	4.4
1991	9	8	35.4	53.4	15	4.7
1991	9	14	32.8	46.4	33	4.2
1991	9	21	32.2	49.0	33	4.9
1991	9	22	39.7	51.9	48	4.4
1991	10	11	31.7	50.8	41	5.4
1991	10	13	27.5	52.3	39	4.4
1991	10	13	28.0	53.2	56	4.9
1991	10	15	34.4	46.7	3	4.7
1991	10	17	36.4	53.1	33	4.3
1991	10	20	31.7	50.1	33	4.4
1991	10	22	29.7	51.5	33	4.6
1991	10	26	33.1	48.2	33	4.3
1991	10	27	28.4	51.2	33	4.1
1991	10	28	34.0	46.8	36	4.4
1991	11	4	29.8	52.2	33	4.0
1991	11	4	30.7	50.3	37	5.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1991	11	12	39.0	45.1	33	4.6
1991	11	18	32.5	50.0	33	4.7
1991	11	29	30.1	50.9	41	5.1
1991	12	1	31.2	51.3	35	4.1
1991	12	1	36.5	45.1	20	4.5
1991	12	2	29.7	51.1	33	4.6
1991	12	6	29.2	51.2	27	4.2
1991	12	8	38.3	48.1	33	4.2
1991	12	9	30.1	50.0	33	4.1
1991	12	14	33.3	47.6	50	4.4
1991	12	22	30.7	49.6	33	4.0
1992	1	10	32.6	47.6	10	4.7
1992	1	27	40.0	42.2	3	3.9
1992	2	6	28.2	52.6	33	5.2
1992	2	6	28.7	52.0	50	4.2
1992	2	25	39.2	45.3	33	3.3
1992	3	5	38.4	45.0	15	4.6
1992	3	10	33.2	49.5	76	4.6
1992	3	13	36.8	45.2	15	5.0
1992	4	4	39.6	42.9	33	4.1
1992	4	10	29.1	52.6	32	4.7
1992	4	16	33.2	48.9	33	4.2
1992	4	19	31.5	48.2	84	4.4
1992	4	26	37.9	47.3	33	4.1
1992	4	29	27.9	51.3	10	5.0
1992	5	7	38.7	40.1	17	5.2
1992	5	9	32.6	47.6	43	5.0
1992	5	13	29.7	51.9	10	4.3
1992	5	16	31.7	49.6	33	4.3
1992	5	23	32.2	50.2	33	4.1
1992	5	28	27.2	53.4	64	4.7
1992	5	29	28.8	51.4	33	4.6
1992	5	31	34.1	46.8	55	4.6
1992	6	12	36.6	49.9	70	4.2
1992	6	30	28.6	52.6	33	4.1
1992	7	4	29.2	50.7	10	4.7
1992	7	14	39.3	41.7	47	4.9
1992	7	20	29.3	51.2	33	4.4
1992	7	31	26.8	54.1	58	4.4
1992	8	10	39.3	40.4	33	4.4
1992	8	15	28.5	51.2	59	4.9
1992	8	16	28.5	51.1	10	4.4
1992	8	27	28.8	52.9	33	4.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1992	9	8	28.8	50.8	10	4.3
1992	9	11	29.9	51.1	47	5.4
1992	9	22	36.3	52.7	35	5.1
1992	9	22	36.7	53.0	33	5.0
1992	9	27	27.9	54.3	17	4.7
1992	10	20	32.0	49.9	35	4.7
1992	11	2	32.7	48.1	89	4.6
1992	11	6	38.0	47.8	33	4.2
1992	12	2	29.5	52.0	10	4.7
1992	12	11	28.3	53.4	33	4.7
1992	12	11	28.6	53.9	37	4.8
1992	12	11	32.9	46.4	63	5.0
1992	12	15	33.4	45.5	33	4.4
1992	12	20	35.9	44.0	33	5.2
1992	12	28	39.2	40.2	10	3.3
1992	12	30	33.3	45.9	10	4.1
1993	1	2	31.6	50.0	33	4.4
1993	1	6	29.0	52.1	24	5.6
1993	1	8	34.2	45.2	51	5.1
1993	1	11	30.6	49.9	30	4.8
1993	1	13	30.4	50.3	10	4.1
1993	1	14	30.5	50.2	37	5.0
1993	1	15	36.7	43.7	20	5.6
1993	1	16	37.1	50.6	33	3.8
1993	1	19	38.0	49.4	34	4.1
1993	1	19	39.2	54.7	33	4.0
1993	1	23	32.9	47.4	51	4.9
1993	2	1	33.3	46.6	89	4.8
1993	2	17	35.5	42.6	44	5.4
1993	2	23	27.1	54.6	10	4.1
1993	3	2	27.0	53.6	33	4.2
1993	3	5	29.6	51.9	33	3.9
1993	3	8	36.5	51.0	15	4.7
1993	3	15	38.2	45.9	21	4.8
1993	3	17	38.3	44.9	26	4.7
1993	3	24	31.8	49.5	33	4.3
1993	3	26	30.7	50.9	20	5.3
1993	3	28	29.2	51.3	33	4.0
1993	3	29	28.0	52.7	50	5.2
1993	4	8	37.9	48.0	2	4.4
1993	4	9	29.5	52.0	1	4.7
1993	4	17	29.7	54.0	33	4.2
1993	4	25	30.1	49.8	33	4.4

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1993	5	1	39.0	48.9	33	4.1
1993	5	12	36.8	52.0	33	4.6
1993	5	20	27.2	54.6	60	4.9
1993	5	25	37.6	46.1	33	4.6
1993	6	2	28.9	47.6	21	4.7
1993	6	2	32.5	48.6	36	4.4
1993	6	9	32.0	49.5	33	4.7
1993	6	9	34.8	53.3	31	4.9
1993	6	14	32.8	47.4	33	4.6
1993	6	19	36.7	54.8	17	4.6
1993	6	21	39.4	40.4	10	4.3
1993	6	22	30.2	50.8	43	5.3
1993	6	28	31.3	49.7	33	4.2
1993	6	30	35.2	53.6	25	4.9
1993	7	6	28.9	51.3	25	5.1
1993	7	17	29.8	51.4	39	4.7
1993	7	29	36.8	44.9	33	4.6
1993	8	2	30.9	51.8	40	5.0
1993	8	3	31.9	51.0	40	4.7
1993	8	13	32.5	49.5	16	5.1
1993	8	19	35.2	52.1	17	4.9
1993	8	20	28.0	53.9	64	4.2
1993	9	2	27.5	54.4	33	4.3
1993	9	8	30.0	52.0	15	5.0
1993	9	24	33.1	48.0	33	4.4
1993	10	2	37.0	43.3	10	3.5
1993	10	17	30.3	51.1	10	4.9
1993	10	18	36.6	53.8	33	4.8
1993	10	23	29.7	51.1	42	4.4
1993	11	3	28.8	52.0	33	4.1
1993	11	16	26.4	55.0	47	4.3
1993	12	7	30.7	51.3	44	4.7
1993	12	17	32.6	45.8	10	4.3
1993	12	29	32.0	49.1	71	4.3
1994	1	4	29.2	51.4	39	5.1
1994	1	6	30.4	50.7	33	4.4
1994	1	15	31.7	49.0	33	4.2
1994	1	17	31.5	49.4	33	4.2
1994	3	1	29.1	52.6	9	6.0
1994	3	3	33.1	47.5	33	4.9
1994	3	7	33.2	48.0	63	5.0
1994	3	9	32.7	47.4	10	4.8
1994	3	12	37.0	49.2	33	3.5

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1994	3	16	32.0	50.4	67	4.3
1994	3	19	28.6	53.1	33	4.6
1994	3	26	39.7	54.6	12	4.9
1994	4	19	31.4	49.6	51	5.0
1994	4	20	32.0	50.5	10	5.2
1994	4	21	27.4	54.4	46	4.9
1994	4	26	30.7	50.7	3	4.8
1994	5	3	34.2	46.7	33	4.4
1994	5	7	30.3	50.6	53	4.9
1994	6	4	36.7	54.8	53	5.0
1994	6	5	29.5	52.2	54	4.8
1994	6	24	30.3	52.0	33	4.2
1994	7	11	37.4	54.4	29	4.9
1994	7	26	27.1	54.1	33	4.2
1994	7	31	31.9	49.4	33	4.4
1994	7	31	32.6	48.4	47	5.6
1994	8	10	27.0	54.4	39	4.9
1994	8	21	30.1	52.4	33	4.2
1994	9	2	33.6	48.9	59	4.6
1994	9	5	29.4	51.3	33	5.0
1994	9	5	39.5	40.3	10	4.0
1994	9	17	37.8	41.6	35	4.6
1994	9	20	28.7	53.4	33	4.3
1994	9	20	29.0	51.7	33	3.9
1994	9	27	31.6	49.0	42	4.7
1994	9	29	28.0	51.9	33	4.0
1994	10	11	33.5	45.7	22	4.6
1994	10	19	31.0	49.8	33	4.7
1994	10	26	36.1	45.6	33	4.6
1994	10	27	31.5	49.5	51	4.9
1994	10	29	39.4	40.7	1	4.4
1994	11	2	38.3	48.3	15	4.9
1994	11	3	28.3	52.2	30	4.8
1994	11	9	36.3	45.4	15	4.9
1994	11	21	36.1	51.9	44	4.5
1994	12	3	32.3	47.3	33	4.7
1994	12	3	37.7	49.3	16	4.9
1994	12	7	31.0	51.2	12	4.6
1994	12	13	27.3	54.9	36	4.6
1994	12	15	38.8	40.5	10	3.1
1995	1	1	30.6	50.4	48	5.3
1995	1	4	29.8	52.0	0	3.9
1995	1	7	35.8	44.2	39	4.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1995	1	21	29.2	52.0	0	4.9
1995	1	24	31.9	47.4	74	4.3
1995	1	25	28.8	51.4	0	4.9
1995	1	25	30.6	51.7	0	3.9
1995	1	29	39.8	40.6	28	5.2
1995	2	14	37.8	42.8	35	4.7
1995	2	15	29.1	51.2	39	4.9
1995	2	19	29.1	53.3	33	4.6
1995	2	20	39.4	54.3	0	4.4
1995	2	22	38.6	44.9	10	4.4
1995	2	26	38.3	43.1	33	4.1
1995	3	3	34.5	45.2	50	4.9
1995	3	8	31.6	50.6	33	4.7
1995	3	8	34.1	46.6	25	4.3
1995	3	13	28.6	51.5	40	4.6
1995	3	16	26.8	54.6	33	4.2
1995	3	22	30.2	51.1	27	4.6
1995	3	25	34.0	47.9	41	4.9
1995	4	1	31.2	46.0	28	4.7
1995	4	3	29.6	51.2	47	4.4
1995	4	18	31.8	49.4	18	5.0
1995	4	22	30.9	49.9	29	5.3
1995	4	23	39.4	42.3	10	3.9
1995	4	26	36.9	49.4	15	4.8
1995	5	1	33.4	48.8	46	4.3
1995	5	3	28.4	52.7	36	5.0
1995	5	15	38.5	49.4	28	4.8
1995	5	18	38.4	45.6	89	4.4
1995	5	27	30.5	51.0	46	4.5
1995	5	27	38.9	48.9	45	5.0
1995	5	31	28.2	53.3	16	4.7
1995	6	1	32.4	47.4	33	4.6
1995	6	3	35.9	53.1	50	4.4
1995	6	4	32.2	49.4	125	4.4
1995	6	7	32.5	48.8	34	5.0
1995	6	8	32.2	49.3	33	4.8
1995	6	10	27.9	54.8	74	4.4
1995	6	15	31.6	49.8	33	4.6
1995	6	17	32.6	46.3	33	4.4
1995	6	17	34.6	46.3	33	4.6
1995	6	25	31.0	50.4	0	4.6
1995	6	26	36.6	51.2	22	4.8
1995	6	26	39.9	48.4	15	4.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1995	6	27	39.9	48.4	73	4.3
1995	7	3	27.7	52.4	33	4.6
1995	7	3	38.9	41.7	33	4.2
1995	7	3	39.1	41.4	13	4.6
1995	7	3	39.3	41.1	33	4.2
1995	7	4	34.4	45.3	59	4.7
1995	7	21	32.6	49.9	59	4.2
1995	8	5	27.4	53.1	0	4.3
1995	8	5	32.1	49.5	78	4.2
1995	9	4	39.8	51.2	33	4.3
1995	9	17	30.5	50.6	0	4.2
1995	9	18	32.3	47.0	33	4.6
1995	10	5	29.9	52.1	51	3.9
1995	10	5	35.2	46.8	33	4.2
1995	10	8	39.9	54.2	81	3.7
1995	10	14	27.1	54.7	35	5.0
1995	10	15	37.0	49.5	25	5.2
1995	10	29	39.6	51.9	40	5.5
1995	11	1	29.3	51.5	23	4.7
1995	11	4	39.0	49.3	10	4.1
1995	11	8	25.9	42.7	0	3.6
1995	11	14	28.6	51.4	33	4.3
1995	11	14	28.9	51.0	33	4.6
1995	11	15	31.7	52.2	43	4.4
1995	11	16	27.6	54.9	33	4.2
1995	11	21	29.6	51.5	27	4.9
1995	11	23	36.0	53.4	15	4.2
1995	11	27	32.4	48.9	67	5.1
1995	11	27	34.0	49.4	0	4.4
1995	12	2	32.7	49.7	107	4.2
1995	12	4	27.9	54.9	46	4.7
1995	12	5	39.4	40.7	10	5.9
1995	12	5	39.5	40.2	74	5.8
1995	12	18	30.6	50.7	33	4.8
1995	12	20	28.6	51.8	33	4.7
1995	12	24	32.7	48.5	62	4.7
1995	12	29	39.6	48.5	74	3.7
1995	12	30	36.9	54.9	24	4.6
1995	12	31	29.4	52.4	57	4.8
1996	1	3	39.0	48.7	30	5.4
1996	1	4	32.1	49.4	54	5.0
1996	1	12	28.5	52.4	144	4.0
1996	1	14	36.6	51.1	33	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1996	1	14	36.8	41.9	10	3.7
1996	1	24	30.0	51.5	62	4.7
1996	1	25	29.3	51.0	51	5.1
1996	1	25	29.9	50.8	0	4.3
1996	1	25	32.2	46.1	10	4.6
1996	1	26	28.8	52.4	57	4.6
1996	1	28	28.4	51.4	33	3.9
1996	1	28	34.3	46.4	38	4.7
1996	1	31	31.9	50.4	66	4.6
1996	2	16	31.1	51.1	35	4.6
1996	3	2	27.7	54.2	60	3.9
1996	3	3	27.3	52.6	33	3.9
1996	3	9	28.6	53.5	37	3.9
1996	3	9	39.6	52.5	50	4.6
1996	3	15	28.8	51.3	36	4.4
1996	3	20	28.4	51.4	50	4.0
1996	3	23	28.8	52.7	25	4.4
1996	3	27	28.7	52.0	22	4.2
1996	3	29	36.4	42.5	83	3.8
1996	3	29	36.5	41.6	33	6.0
1996	3	31	29.6	50.6	48	4.7
1996	3	31	29.8	50.5	14	5.1
1996	4	1	31.1	50.7	240	3.7
1996	4	2	29.3	50.9	0	3.9
1996	4	2	29.4	51.6	54	4.1
1996	4	6	30.0	49.6	0	4.0
1996	4	7	23.5	50.1	33	3.6
1996	4	10	37.8	43.2	10	3.8
1996	4	11	32.6	49.1	33	4.2
1996	4	14	28.9	53.0	0	3.9
1996	4	15	26.7	54.3	145	4.0
1996	4	18	33.7	47.2	20	4.3
1996	4	19	35.3	46.3	46	3.8
1996	4	20	27.9	51.9	37	4.8
1996	4	21	38.5	40.3	10	3.7
1996	4	22	38.9	40.5	13	4.5
1996	4	22	39.2	47.4	28	5.2
1996	4	26	33.7	50.9	87	4.1
1996	5	1	28.4	52.6	46	4.1
1996	5	3	39.5	54.3	23	3.8
1996	5	6	32.8	48.7	33	4.2
1996	5	10	30.9	50.1	34	4.4
1996	5	12	36.2	45.7	50	3.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1996	5	18	34.4	47.7	29	4.2
1996	5	23	28.1	54.8	33	4.0
1996	5	24	27.9	53.6	49	5.2
1996	5	25	32.6	53.3	0	3.9
1996	5	28	32.4	49.5	33	3.8
1996	5	28	37.6	48.9	87	4.1
1996	5	29	28.2	51.6	50	4.2
1996	6	2	30.7	50.8	39	4.9
1996	6	5	39.7	42.4	10	4.0
1996	6	8	27.8	54.3	76	3.9
1996	6	9	28.7	51.8	0	3.8
1996	6	9	40.0	48.5	33	3.6
1996	6	12	27.0	44.1	0	4.2
1996	6	18	33.9	45.6	33	4.1
1996	6	18	39.1	45.8	30	5.1
1996	6	21	24.0	50.1	16	4.1
1996	6	24	24.7	49.9	43	3.9
1996	6	27	23.8	50.6	20	3.7
1996	7	2	27.1	44.6	33	3.9
1996	7	3	37.9	42.6	12	5.0
1996	7	15	32.4	49.7	77	4.7
1996	7	16	32.7	47.8	62	4.7
1996	7	17	37.5	49.8	33	4.1
1996	7	19	39.8	54.0	30	4.7
1996	7	21	28.2	52.3	38	4.7
1996	7	21	28.8	52.5	80	4.2
1996	7	25	37.4	49.5	57	4.4
1996	7	27	36.2	48.6	49	4.1
1996	8	6	27.6	53.0	24	4.9
1996	8	6	28.6	51.7	83	4.3
1996	8	8	37.0	49.7	33	3.9
1996	8	9	36.1	47.0	33	4.0
1996	8	20	36.4	53.1	8	3.8
1996	8	22	28.3	51.4	33	4.3
1996	8	24	31.5	50.9	64	4.4
1996	8	25	29.7	51.5	23	4.0
1996	8	25	35.9	53.0	15	4.4
1996	9	4	35.3	46.3	46	4.4
1996	9	14	29.8	51.6	49	4.2
1996	9	18	39.6	41.4	15	4.3
1996	9	20	32.5	50.0	52	4.2
1996	9	23	27.1	44.2	0	4.1
1996	9	25	27.9	51.2	10	4.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1996	9	26	29.8	52.1	48	4.3
1996	9	29	33.4	46.0	49	4.6
1996	10	4	29.5	51.3	52	4.1
1996	10	9	28.4	52.9	33	4.2
1996	10	15	27.7	54.2	41	4.3
1996	10	20	27.3	44.0	20	4.2
1996	10	22	39.4	52.0	33	4.1
1996	10	27	30.7	50.2	33	4.3
1996	11	2	27.3	54.8	33	4.2
1996	11	8	31.6	50.3	59	4.6
1996	11	18	29.9	51.6	26	5.3
1996	11	23	27.0	54.8	20	4.1
1996	11	24	27.6	53.6	10	4.3
1996	12	4	27.4	52.6	39	4.9
1996	12	6	28.2	53.9	77	4.3
1996	12	9	31.8	50.8	57	4.3
1996	12	12	38.0	43.3	10	3.7
1996	12	14	28.5	49.7	12	4.7
1996	12	20	28.6	52.0	21	4.2
1996	12	20	29.3	51.4	48	4.8
1996	12	20	38.9	41.0	30	4.2
1996	12	21	30.5	49.9	50	4.1
1996	12	26	30.7	51.3	46	4.6
1997	1	11	39.5	54.4	33	4.8
1997	1	15	29.0	52.0	52	4.1
1997	1	19	29.5	51.9	28	4.2
1997	1	29	27.5	44.3	45	4.0
1997	2	4	24.5	48.9	2	4.4
1997	2	10	31.3	49.5	33	4.2
1997	2	11	27.4	53.3	33	4.0
1997	2	13	38.7	48.8	65	4.1
1997	2	15	28.9	52.6	44	4.5
1997	2	15	38.3	40.4	36	4.0
1997	2	17	31.4	49.8	67	4.7
1997	2	17	36.8	54.7	15	4.3
1997	2	18	27.0	44.3	1	4.1
1997	2	28	38.1	48.0	44	6.1
1997	3	4	37.3	40.8	33	3.9
1997	3	4	39.2	41.1	10	4.4
1997	3	4	39.3	40.7	46	5.0
1997	3	9	29.8	51.3	61	4.6
1997	3	13	39.9	40.1	10	4.3
1997	3	18	39.7	42.1	33	3.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1997	3	20	32.8	49.1	67	4.3
1997	4	1	37.9	48.9	74	3.7
1997	4	10	33.3	47.4	73	4.3
1997	4	19	39.0	42.3	10	4.6
1997	4	20	37.0	42.7	33	4.7
1997	4	22	28.4	52.8	58	5.0
1997	4	26	38.9	45.6	10	3.8
1997	4	27	24.4	50.5	33	3.7
1997	4	28	24.0	50.9	23	4.2
1997	4	30	40.0	51.9	20	3.9
1997	5	3	27.3	53.5	33	4.8
1997	5	3	27.6	53.3	33	4.2
1997	5	4	26.7	54.4	33	4.2
1997	5	5	27.1	53.9	48	5.1
1997	5	10	39.9	46.4	33	3.9
1997	5	12	28.7	52.5	39	4.2
1997	5	14	28.5	54.1	191	3.9
1997	5	14	38.3	45.2	24	3.8
1997	5	17	32.9	46.1	33	4.0
1997	5	19	27.0	52.4	33	4.3
1997	5	26	28.6	51.5	61	4.8
1997	5	26	32.9	47.0	44	4.9
1997	5	28	38.7	48.5	69	4.1
1997	5	29	38.0	41.5	10	4.1
1997	5	31	34.5	47.4	25	4.3
1997	6	1	39.9	42.1	10	4.3
1997	6	2	34.1	48.3	48	4.5
1997	6	4	26.8	52.5	64	4.2
1997	6	7	36.5	50.4	28	4.8
1997	6	8	27.7	43.8	5	3.8
1997	6	15	26.6	44.9	5	3.7
1997	6	22	39.6	49.3	33	4.0
1997	6	23	28.1	51.9	57	5.0
1997	6	23	31.8	49.2	0	3.8
1997	6	23	35.6	52.5	33	4.0
1997	7	9	27.4	54.6	37	4.3
1997	7	9	28.0	53.8	47	4.4
1997	7	10	31.8	49.6	60	3.9
1997	7	10	39.0	40.5	35	3.8
1997	7	11	31.8	50.4	32	4.0
1997	7	13	38.2	43.3	10	4.2
1997	7	21	29.4	53.2	43	4.1
1997	7	27	29.1	52.4	43	4.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1997	7	28	30.0	50.8	45	4.1
1997	7	28	30.0	51.0	157	4.0
1997	7	29	27.0	54.4	75	4.3
1997	7	30	29.8	51.0	51	4.3
1997	8	2	23.5	50.2	33	3.9
1997	8	5	23.7	49.6	45	3.9
1997	8	8	39.8	41.9	10	4.5
1997	8	14	29.0	51.5	47	4.7
1997	8	21	32.2	48.9	71	5.1
1997	8	24	26.7	53.5	33	3.9
1997	8	24	28.8	52.7	2	4.8
1997	8	24	37.8	48.9	64	4.4
1997	8	24	38.4	54.1	10	4.1
1997	8	26	36.6	53.1	43	4.3
1997	8	28	39.5	40.9	10	4.1
1997	9	3	28.7	53.1	33	4.2
1997	9	13	27.6	53.1	34	4.3
1997	9	16	36.8	54.1	30	4.7
1997	9	18	28.9	47.5	44	4.6
1997	9	20	32.1	50.3	0	4.0
1997	9	20	38.9	40.2	7	4.3
1997	9	21	26.2	44.2	33	3.8
1997	9	21	27.0	54.0	95	4.3
1997	9	22	32.6	48.8	50	4.1
1997	9	24	31.9	49.4	33	4.0
1997	9	26	39.2	41.3	74	4.3
1997	9	26	39.3	40.8	33	4.3
1997	9	28	26.2	44.1	1	3.9
1997	9	29	31.2	40.1	35	3.9
1997	10	2	39.0	44.3	45	4.4
1997	10	3	27.8	54.7	48	5.3
1997	10	9	39.1	41.3	7	3.8
1997	10	10	38.5	44.3	7	4.4
1997	10	12	38.5	43.3	18	4.6
1997	10	15	27.7	54.3	33	3.9
1997	10	22	38.0	42.6	10	4.2
1997	10	23	28.1	53.9	34	5.0
1997	10	27	30.9	49.7	33	4.3
1997	11	3	27.7	52.4	33	4.3
1997	11	3	36.3	54.5	15	5.0
1997	11	3	38.6	41.0	12	4.5
1997	11	3	38.8	42.5	8	4.6
1997	11	3	38.8	42.3	59	4.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1997	11	5	34.9	51.4	44	4.4
1997	11	5	38.3	43.0	10	4.4
1997	11	18	32.6	47.5	185	4.2
1997	11	18	32.8	48.0	33	4.4
1997	11	18	33.7	46.1	33	4.3
1997	12	9	32.4	49.4	60	4.3
1997	12	9	37.0	42.8	35	4.9
1997	12	12	39.8	41.9	10	4.4
1997	12	15	29.1	51.2	34	4.4
1997	12	22	25.1	48.9	40	3.9
1997	12	22	25.4	47.8	15	3.7
1997	12	22	29.2	54.2	0	4.2
1997	12	26	28.0	53.3	28	4.8
1997	12	30	28.8	47.6	24	4.3
1998	1	1	29.8	51.5	36	4.6
1998	1	2	36.9	52.4	33	4.0
1998	1	4	28.8	51.6	28	4.3
1998	1	9	36.4	52.1	15	4.9
1998	1	11	30.4	50.9	5	5.0
1998	1	11	30.5	50.7	69	4.9
1998	1	13	28.9	52.1	33	4.2
1998	1	13	31.0	51.1	33	4.4
1998	1	18	28.3	54.7	33	4.1
1998	1	19	33.8	46.0	34	4.8
1998	1	20	31.4	49.1	33	4.2
1998	1	23	39.3	43.9	25	5.1
1998	1	24	35.8	53.6	20	4.9
1998	1	30	37.1	50.6	48	4.2
1998	1	31	28.3	53.0	33	4.0
1998	2	1	32.1	49.7	33	4.0
1998	2	6	39.9	53.9	31	4.1
1998	2	8	27.0	54.1	52	4.2
1998	2	8	29.5	50.6	55	4.7
1998	2	8	32.3	49.2	48	4.5
1998	2	9	33.9	48.3	50	4.4
1998	2	19	32.6	48.2	56	4.8
1998	2	23	29.8	50.1	34	4.2
1998	2	24	39.8	41.3	10	4.2
1998	2	27	39.6	49.1	53	4.5
1998	2	28	37.0	48.8	15	4.7
1998	3	10	28.7	52.2	33	4.4
1998	3	14	28.3	53.0	104	4.1
1998	3	16	34.3	45.4	158	4.4

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1998	3	17	28.6	49.3	33	4.1
1998	3	18	27.7	52.4	10	4.3
1998	3	18	27.7	54.1	54	4.5
1998	3	24	27.2	48.1	0	4.0
1998	4	1	30.6	49.9	33	4.4
1998	4	4	36.6	49.5	17	4.1
1998	4	7	27.4	53.6	21	4.3
1998	4	11	32.1	44.4	0	3.9
1998	4	13	39.3	41.1	15	5.3
1998	4	13	39.9	42.0	10	4.7
1998	4	17	26.9	54.7	19	4.5
1998	4	18	35.5	48.9	33	3.8
1998	4	18	39.9	41.0	23	3.6
1998	4	20	36.8	49.2	33	3.5
1998	4	24	39.2	41.7	6	3.7
1998	4	27	39.9	40.5	3	3.8
1998	4	28	38.7	40.4	10	4.7
1998	4	28	39.6	42.6	4	4.2
1998	5	11	39.7	42.3	29	4.1
1998	5	16	31.3	50.1	33	4.6
1998	5	17	36.5	43.9	33	3.9
1998	5	20	30.4	51.7	37	4.3
1998	5	28	29.6	51.3	33	4.0
1998	5	30	30.3	52.1	134	3.8
1998	6	2	28.5	52.4	33	4.3
1998	6	3	39.6	40.7	10	4.0
1998	6	4	28.7	51.6	33	4.0
1998	6	15	31.7	50.9	51	5.2
1998	6	28	30.8	50.0	33	4.3
1998	6	28	31.2	51.9	68	4.0
1998	6	29	29.8	51.6	33	4.0
1998	6	29	33.3	49.2	33	3.7
1998	7	7	36.2	52.1	33	3.8
1998	7	9	38.7	48.5	26	6.0
1998	7	9	38.8	49.2	20	5.9
1998	7	16	28.9	54.8	33	4.0
1998	7	17	38.2	49.8	33	3.8
1998	7	18	35.7	45.6	33	3.8
1998	7	19	29.5	51.9	33	4.1
1998	7	24	32.2	49.5	123	3.9
1998	7	30	37.6	49.2	42	4.3
1998	7	31	28.3	50.8	10	4.1
1998	7	31	38.6	42.8	33	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1998	8	4	32.5	49.0	94	4.0
1998	8	5	33.1	46.2	53	5.6
1998	8	6	32.0	47.3	72	4.3
1998	8	6	32.0	50.6	177	3.8
1998	8	7	37.7	43.5	15	4.8
1998	8	19	27.6	52.5	33	4.3
1998	8	21	34.1	48.2	47	5.0
1998	8	30	36.1	52.1	33	3.8
1998	9	4	28.7	52.4	46	4.6
1998	9	8	37.1	44.6	33	4.1
1998	9	16	29.3	51.9	33	4.3
1998	9	19	31.9	50.1	44	4.5
1998	9	21	31.1	51.3	47	5.1
1998	9	25	39.6	44.1	15	4.1
1998	9	28	36.5	48.7	15	4.4
1998	9	29	29.5	51.4	56	4.4
1998	9	29	38.6	43.8	10	4.0
1998	10	5	33.2	47.2	18	5.4
1998	10	8	38.8	40.4	15	4.5
1998	10	11	39.0	42.7	56	4.0
1998	10	18	28.6	54.2	98	4.4
1998	10	19	28.5	54.5	33	4.1
1998	10	20	39.6	40.4	13	4.2
1998	10	29	32.3	48.9	84	4.7
1998	11	6	38.9	42.6	13	4.2
1998	11	7	37.1	44.7	57	4.1
1998	11	8	29.1	51.5	33	4.0
1998	11	8	29.6	51.4	11	4.3
1998	11	10	39.2	40.3	15	4.7
1998	11	12	33.2	49.6	45	4.2
1998	11	12	39.7	54.0	68	4.3
1998	11	13	27.8	53.6	15	5.4
1998	11	13	27.9	53.7	81	4.2
1998	11	13	30.6	50.4	57	4.6
1998	11	13	36.0	43.3	0	3.8
1998	11	14	27.4	53.5	33	4.4
1998	11	16	28.4	51.6	43	4.2
1998	11	16	30.9	50.1	33	4.0
1998	11	17	29.8	50.3	26	4.2
1998	11	18	38.4	45.3	26	4.9
1998	11	19	30.2	51.0	36	4.1
1998	11	19	36.2	54.0	51	4.6
1998	11	26	31.5	49.7	33	4.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1998	12	1	32.6	48.1	33	4.4
1998	12	3	36.1	51.0	46	4.4
1998	12	3	36.3	51.1	100	4.1
1998	12	9	31.0	49.6	25	4.5
1998	12	9	33.3	47.7	33	4.6
1998	12	10	36.1	54.6	33	4.1
1998	12	19	26.7	54.9	33	4.4
1998	12	19	36.9	51.0	15	4.3
1998	12	20	38.6	40.1	5	4.7
1998	12	26	34.8	54.2	69	4.2
1999	1	3	34.4	45.7	33	4.0
1999	1	13	36.1	44.0	57	4.0
1999	1	13	38.3	40.4	10	3.8
1999	1	15	35.4	45.2	25	5.1
1999	1	16	27.8	53.7	70	4.1
1999	1	23	38.2	44.0	10	4.3
1999	1	29	30.3	50.6	9	5.0
1999	1	29	38.7	42.1	10	4.2
1999	2	3	28.1	51.8	48	3.8
1999	2	4	32.8	49.7	264	3.9
1999	2	4	34.1	45.6	50	4.4
1999	2	7	35.8	43.4	33	4.3
1999	2	7	36.8	43.8	138	4.0
1999	2	10	27.7	52.0	10	4.4
1999	2	10	39.9	40.6	10	4.1
1999	2	14	33.6	46.8	23	4.4
1999	2	16	28.5	52.1	33	4.4
1999	2	19	38.7	44.5	15	4.6
1999	2	24	29.1	52.6	33	4.2
1999	2	24	32.8	48.1	0	3.9
1999	2	24	32.8	48.0	70	4.1
1999	2	24	32.9	48.8	33	3.7
1999	3	1	27.6	54.5	33	3.7
1999	3	1	38.1	41.2	6	4.4
1999	3	1	39.2	40.8	10	3.9
1999	3	9	32.2	47.8	33	4.3
1999	3	9	39.1	44.9	67	4.3
1999	3	10	28.3	54.8	0	4.0
1999	3	12	27.2	53.4	20	4.7
1999	3	13	35.6	53.7	33	4.2
1999	3	14	27.3	50.9	33	4.1
1999	3	25	27.0	54.1	0	3.9
1999	3	26	36.5	50.1	15	4.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1999	3	31	28.4	53.3	33	4.1
1999	4	5	28.0	52.8	33	4.0
1999	4	5	39.6	42.3	10	4.3
1999	4	18	39.3	40.2	8	4.0
1999	4	25	36.7	43.3	56	3.9
1999	4	25	37.7	41.1	12	4.1
1999	4	26	27.1	54.5	91	4.2
1999	4	26	36.5	43.6	33	4.2
1999	4	28	27.9	53.5	80	4.4
1999	4	30	28.8	53.5	36	5.2
1999	4	30	35.9	45.6	46	4.2
1999	5	2	28.4	52.1	33	4.0
1999	5	2	31.5	49.6	33	4.3
1999	5	2	35.9	43.3	42	4.0
1999	5	6	29.3	51.7	97	4.2
1999	5	6	29.3	52.2	115	5.7
1999	5	6	29.5	51.9	17	6.3
1999	5	6	29.6	51.7	74	6.3
1999	5	7	28.5	52.7	33	4.9
1999	5	7	29.7	52.6	33	4.8
1999	5	7	29.9	52.4	0	4.3
1999	5	7	30.9	50.5	368	3.1
1999	5	7	32.0	52.6	33	3.8
1999	5	8	31.9	51.7	0	3.5
1999	5	9	39.0	41.2	4	4.1
1999	5	10	29.0	52.1	45	4.1
1999	5	10	30.3	52.4	33	4.2
1999	5	13	27.4	53.7	99	4.1
1999	5	15	29.8	53.5	0	3.2
1999	5	18	28.9	52.4	33	3.7
1999	5	22	30.7	52.1	33	4.2
1999	6	7	30.0	50.8	125	3.9
1999	6	7	37.7	41.2	8	4.2
1999	6	18	34.1	46.7	33	4.4
1999	6	22	37.1	43.6	33	4.0
1999	7	3	29.1	52.6	40	4.3
1999	7	5	30.5	50.2	42	4.9
1999	7	10	32.2	48.2	57	4.3
1999	7	16	37.1	45.3	47	4.2
1999	7	20	39.8	41.4	35	4.7
1999	7	26	33.7	48.3	48	4.5
1999	8	4	28.3	51.9	33	4.2
1999	8	10	36.2	54.6	20	4.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
1999	8	12	39.8	54.1	40	4.8
1999	8	19	38.4	46.4	15	4.8
1999	8	22	39.3	40.2	28	4.6
1999	8	28	34.5	46.1	33	4.0
1999	9	4	31.9	48.6	33	4.3
1999	9	13	31.9	50.6	43	4.9
1999	9	16	36.8	42.4	33	4.4
1999	9	17	29.1	52.6	44	4.3
1999	9	24	28.7	51.4	31	5.3
1999	9	29	27.2	53.1	43	4.7
1999	10	6	29.7	51.0	33	4.1
1999	10	15	28.4	54.0	50	4.1
1999	10	17	39.8	40.1	9	4.2
1999	10	24	39.5	41.1	9	4.4
1999	10	26	30.2	51.8	58	4.1
1999	10	31	38.6	41.5	5	4.0
1999	11	19	37.3	54.4	31	5.4
1999	11	20	36.0	41.6	5	4.4
1999	11	23	40.0	43.1	10	4.1
1999	11	25	31.2	50.0	98	4.2
1999	11	26	36.9	54.9	10	5.3
1999	11	28	38.9	40.7	10	4.1
1999	12	8	34.3	46.4	19	4.3
1999	12	9	36.5	53.6	15	4.7
1999	12	15	31.1	51.2	33	4.4
1999	12	16	27.9	54.1	82	4.1
1999	12	17	27.1	54.4	63	4.8
1999	12	18	37.5	42.7	10	4.5
1999	12	19	26.7	54.9	79	4.4
1999	12	22	27.9	54.1	40	5.1
1999	12	25	28.3	53.7	33	3.8
1999	12	25	33.3	47.1	33	4.3
1999	12	27	28.1	51.8	0	4.3
1999	12	30	29.1	51.4	78	4.2
1999	12	30	34.5	45.4	66	4.7
2000	1	2	23.2	41.5	20	3.3
2000	1	3	26.7	53.7	33	4.4
2000	1	3	35.0	45.1	33	4.4
2000	1	4	31.6	49.3	143	4.0
2000	1	16	29.0	51.6	175	4.1
2000	1	18	34.8	44.4	83	4.2
2000	1	21	27.1	54.9	33	4.0
2000	1	26	39.9	52.9	40	5.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2000	1	28	37.7	49.1	9	4.2
2000	1	31	23.2	42.3	10	3.0
2000	2	1	39.1	41.1	10	4.3
2000	2	6	30.5	50.4	9	4.6
2000	2	7	32.6	48.8	75	4.1
2000	2	9	28.8	54.6	33	3.9
2000	2	10	28.6	51.8	20	4.4
2000	2	10	28.8	54.9	61	5.0
2000	2	17	23.1	41.2	10	3.2
2000	2	18	31.4	49.6	76	4.3
2000	2	20	29.3	50.1	33	3.6
2000	2	26	37.4	44.5	43	4.8
2000	2	26	38.3	43.0	12	5.2
2000	3	1	28.4	52.9	47	5.1
2000	3	3	30.3	50.5	33	4.0
2000	3	5	27.4	52.8	0	3.9
2000	3	6	29.2	52.4	33	4.3
2000	3	7	31.9	50.9	56	4.6
2000	3	12	31.8	50.1	63	4.6
2000	3	14	29.0	52.0	52	4.9
2000	3	15	34.4	45.8	33	5.1
2000	3	20	28.4	52.3	33	4.3
2000	3	28	38.8	41.5	10	4.4
2000	4	1	30.4	51.1	39	3.9
2000	4	1	31.4	50.8	33	3.8
2000	4	7	27.8	52.4	33	3.7
2000	4	7	32.9	47.6	149	3.0
2000	4	8	32.8	48.5	40	3.6
2000	4	10	30.0	51.3	70	3.9
2000	4	10	38.1	48.1	18	4.4
2000	4	10	38.5	40.2	7	4.1
2000	4	12	33.0	49.5	71	4.6
2000	4	12	39.9	46.9	88	3.6
2000	4	13	28.1	53.4	33	3.9
2000	4	15	32.2	49.3	33	4.6
2000	4	18	33.1	49.8	33	3.6
2000	4	20	28.2	53.8	35	4.3
2000	4	28	37.2	49.6	40	3.7
2000	5	3	29.5	50.2	33	3.3
2000	5	3	29.6	50.8	31	5.1
2000	5	3	29.7	51.0	165	3.6
2000	5	3	29.7	50.9	87	4.0
2000	5	3	33.7	52.8	33	4.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2000	5	4	30.1	50.7	33	4.2
2000	5	5	29.5	53.0	33	3.7
2000	5	8	31.4	49.2	44	4.0
2000	5	12	34.2	51.8	10	3.5
2000	5	16	28.8	50.4	10	3.3
2000	5	19	38.3	49.2	10	4.1
2000	5	19	38.5	48.4	10	4.3
2000	5	24	30.2	51.4	164	3.7
2000	6	5	31.8	50.2	33	4.0
2000	6	6	29.1	48.2	89	3.5
2000	6	9	32.6	50.4	33	3.9
2000	6	14	31.4	49.8	7	4.0
2000	6	15	39.1	41.6	10	4.3
2000	6	18	33.3	46.2	39	3.6
2000	6	19	29.7	50.0	22	3.3
2000	6	19	30.9	50.0	33	3.7
2000	6	23	30.1	51.7	27	5.2
2000	6	24	31.8	50.9	54	4.3
2000	6	27	38.9	40.1	10	4.2
2000	7	2	32.5	48.8	33	4.1
2000	7	3	35.9	54.8	33	4.3
2000	7	5	30.7	50.1	18	3.1
2000	7	6	32.8	49.4	33	3.3
2000	7	9	30.2	50.2	33	3.5
2000	7	9	39.3	40.8	5	4.1
2000	7	10	33.1	52.8	38	4.5
2000	7	10	33.7	52.3	39	4.2
2000	7	10	39.0	42.3	10	3.8
2000	7	11	32.1	49.7	33	3.0
2000	7	13	27.2	54.9	33	4.2
2000	7	14	29.5	52.7	33	4.1
2000	7	20	30.0	50.9	33	4.0
2000	7	20	31.4	49.9	95	4.0
2000	7	21	35.0	46.6	4	3.8
2000	7	22	30.4	51.0	33	3.1
2000	7	25	35.0	53.0	33	4.0
2000	7	27	29.1	52.5	33	3.9
2000	7	29	29.1	52.2	58	4.1
2000	7	30	27.8	53.7	33	4.0
2000	8	2	32.8	47.0	33	3.6
2000	8	7	28.7	52.2	10	3.8
2000	8	7	33.3	47.1	22	4.1
2000	8	7	37.5	40.9	8	4.4

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2000	8	13	33.1	49.3	33	3.9
2000	8	15	29.6	50.3	32	4.4
2000	8	16	36.6	54.6	33	4.9
2000	8	19	39.8	41.5	33	4.0
2000	8	24	28.8	51.5	40	3.7
2000	8	24	33.6	47.0	73	4.0
2000	8	30	30.4	52.3	33	4.0
2000	9	3	34.3	48.0	17	4.0
2000	9	4	39.0	41.7	5	4.1
2000	9	6	33.1	45.5	33	4.0
2000	9	7	31.6	49.3	33	3.2
2000	9	7	38.5	45.1	44	4.1
2000	9	10	26.4	54.9	34	4.4
2000	9	10	30.9	51.4	33	3.8
2000	9	11	35.7	45.2	15	4.8
2000	9	13	27.8	51.7	19	4.9
2000	9	13	28.4	51.9	30	3.3
2000	9	21	31.1	52.9	33	4.3
2000	9	21	31.4	50.0	47	4.2
2000	9	24	39.5	43.7	15	4.7
2000	9	27	29.6	51.3	19	4.1
2000	10	1	28.9	51.3	0	4.1
2000	10	2	35.3	45.7	35	4.3
2000	10	3	32.6	47.7	19	3.4
2000	10	5	34.9	46.7	9	4.0
2000	10	5	39.3	54.6	33	4.0
2000	10	6	37.1	45.2	33	4.3
2000	10	9	29.2	53.1	33	3.8
2000	10	9	30.0	50.3	19	3.2
2000	10	10	30.7	49.8	2	4.1
2000	10	12	33.2	49.4	40	4.0
2000	10	13	29.8	51.0	33	3.5
2000	10	13	30.7	49.7	42	4.9
2000	10	16	28.2	40.0	10	3.1
2000	10	21	34.5	47.6	39	3.7
2000	10	23	23.2	48.0	522	3.1
2000	10	23	33.0	47.0	33	3.1
2000	10	24	37.0	42.5	10	4.4
2000	10	25	37.7	43.4	3	4.4
2000	10	27	36.4	44.7	33	4.4
2000	10	28	29.3	50.9	2	3.7
2000	10	28	39.9	46.5	87	3.6
2000	10	29	32.4	48.9	33	3.6

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2000	11	6	32.1	47.9	40	3.2
2000	11	7	31.9	47.6	35	3.1
2000	11	8	31.7	50.1	33	4.3
2000	11	8	32.8	49.8	40	4.0
2000	11	9	29.8	48.2	13	3.0
2000	11	10	32.5	48.4	33	4.0
2000	11	11	27.5	52.9	38	4.7
2000	11	13	35.4	44.5	49	4.4
2000	11	15	37.9	42.8	12	4.7
2000	11	15	38.5	42.9	62	5.6
2000	11	15	38.8	42.8	12	4.4
2000	11	16	29.3	51.0	38	3.4
2000	11	16	38.4	42.9	8	4.3
2000	11	17	34.2	48.1	37	4.2
2000	11	22	32.0	49.6	39	3.7
2000	11	25	39.2	48.2	62	3.9
2000	11	28	32.4	46.8	37	3.1
2000	11	29	28.0	53.6	10	4.4
2000	11	29	39.9	50.2	33	5.3
2000	12	3	33.8	49.2	33	3.2
2000	12	6	39.6	54.8	30	7.0
2000	12	12	32.3	49.2	0	3.3
2000	12	12	39.8	43.5	10	4.2
2000	12	22	35.8	45.9	33	4.4
2000	12	23	27.9	52.1	33	3.9
2000	12	23	28.7	49.6	0	4.0
2000	12	24	38.6	40.3	39	4.4
2000	12	28	28.0	51.3	10	4.4
2000	12	29	39.4	53.9	37	4.4
2001	1	1	39.9	42.3	8	3.8
2001	1	3	39.4	52.9	47	4.9
2001	1	4	38.8	43.2	5	4.1
2001	1	5	38.8	40.9	10	3.9
2001	1	12	38.9	42.2	14	3.8
2001	1	14	39.2	43.0	10	4.3
2001	1	21	34.7	46.5	33	4.0
2001	1	27	30.5	50.5	24	4.7
2001	1	28	38.5	43.0	10	4.1
2001	2	1	38.7	44.6	10	4.3
2001	2	3	39.2	41.1	12	3.7
2001	2	4	31.1	50.0	68	3.1
2001	2	6	36.4	42.6	33	4.4
2001	2	9	30.3	51.1	40	3.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2001	2	10	32.9	48.2	27	3.3
2001	2	10	38.8	43.6	29	4.1
2001	2	12	33.4	46.9	6	4.6
2001	2	13	32.3	49.9	34	3.1
2001	2	16	34.6	52.2	64	4.4
2001	2	19	31.2	54.1	66	4.8
2001	2	19	32.2	48.8	8	3.2
2001	2	21	31.2	51.1	24	3.2
2001	2	21	31.3	49.3	3	3.8
2001	2	26	31.0	49.9	33	4.0
2001	2	26	32.5	45.3	18	3.4
2001	2	26	39.3	51.8	18	3.5
2001	2	27	38.6	41.4	10	3.8
2001	2	27	39.0	40.0	10	3.9
2001	2	28	30.7	49.4	9	3.1
2001	3	2	30.5	51.6	33	3.9
2001	3	4	34.7	53.7	23	4.6
2001	3	4	35.1	53.2	7	3.8
2001	3	8	39.0	54.5	24	4.2
2001	3	10	28.8	53.2	33	3.7
2001	3	23	27.1	53.8	38	4.4
2001	3	23	32.9	46.6	33	5.5
2001	3	28	29.9	51.3	15	5.3
2001	3	29	28.8	52.2	56	4.0
2001	3	29	38.7	40.6	14	3.7
2001	4	3	31.2	50.9	33	4.2
2001	4	3	32.5	48.0	27	5.2
2001	4	6	28.3	52.3	53	4.1
2001	4	7	29.6	51.0	118	3.5
2001	4	7	29.7	50.4	124	3.4
2001	4	10	39.8	49.3	33	3.8
2001	4	13	28.2	54.9	29	5.1
2001	4	13	28.5	54.3	33	3.9
2001	4	14	28.6	53.8	33	4.0
2001	4	20	27.7	53.9	62	3.8
2001	4	20	39.3	44.3	44	3.6
2001	4	20	39.3	45.0	7	4.1
2001	4	20	39.7	42.9	10	4.5
2001	4	21	32.4	54.6	2	3.1
2001	4	22	29.4	51.4	28	4.1
2001	4	22	29.9	47.9	13	4.1
2001	4	28	34.2	50.3	10	3.2
2001	4	29	24.1	40.2	650	3.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2001	4	29	26.5	43.5	20	3.2
2001	4	29	40.0	48.5	54	4.2
2001	4	30	33.7	53.6	33	4.4
2001	5	6	29.1	51.3	18	4.5
2001	5	7	26.8	54.9	33	3.9
2001	5	9	31.9	49.4	33	3.4
2001	5	11	38.5	40.7	33	4.0
2001	5	11	38.7	40.0	10	3.7
2001	5	12	30.7	50.2	31	3.4
2001	5	13	25.4	45.5	0	3.1
2001	5	16	36.3	52.7	26	4.9
2001	5	21	32.1	51.0	33	3.6
2001	5	21	39.9	49.3	33	3.8
2001	5	23	27.9	52.6	22	4.6
2001	5	23	33.2	50.9	33	3.7
2001	5	23	33.5	51.0	33	4.2
2001	5	24	26.7	53.5	28	4.5
2001	5	24	31.7	49.9	35	4.6
2001	5	24	33.0	47.5	33	4.4
2001	5	28	35.8	46.1	59	4.0
2001	5	31	28.8	51.3	33	3.3
2001	6	2	38.7	54.8	16	4.2
2001	6	9	29.4	52.2	55	4.3
2001	6	10	29.5	51.0	10	4.3
2001	6	10	29.6	50.6	48	4.3
2001	6	10	39.8	53.9	30	5.4
2001	6	12	39.0	47.3	15	4.8
2001	6	15	38.8	42.5	10	4.3
2001	6	17	39.0	45.8	33	4.3
2001	6	19	31.1	51.1	18	3.9
2001	6	20	34.3	49.9	6	3.1
2001	6	21	27.9	54.0	41	3.9
2001	6	24	35.8	52.2	4	3.8
2001	7	1	30.6	52.9	15	3.4
2001	7	2	30.7	50.1	33	3.5
2001	7	5	30.6	50.4	33	3.4
2001	7	6	32.5	48.6	33	3.2
2001	7	8	28.3	53.4	33	3.8
2001	7	8	39.5	40.5	5	4.1
2001	7	10	39.8	41.6	35	5.4
2001	7	12	28.8	51.6	42	4.1
2001	7	14	39.5	40.9	10	4.1
2001	7	15	30.5	50.0	116	3.4

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2001	7	17	31.8	51.2	37	4.0
2001	7	18	30.3	52.5	15	3.3
2001	7	20	28.0	51.8	10	4.0
2001	7	22	30.3	50.2	33	3.0
2001	7	24	27.9	51.4	33	3.3
2001	7	24	30.3	51.5	33	3.6
2001	7	30	34.8	52.4	21	3.1
2001	8	5	30.6	50.8	33	4.1
2001	8	5	32.9	47.6	69	4.6
2001	8	6	29.0	52.3	25	4.4
2001	8	6	31.1	50.9	33	3.9
2001	8	7	30.9	51.7	33	3.6
2001	8	9	29.2	50.7	33	3.1
2001	8	9	32.4	48.1	70	3.9
2001	8	12	29.5	51.8	33	3.0
2001	8	12	34.4	50.9	15	3.5
2001	8	12	37.3	44.1	25	4.9
2001	8	13	31.0	48.9	16	3.0
2001	8	13	35.2	45.4	35	4.4
2001	8	15	28.4	52.9	33	4.2
2001	8	18	32.2	49.8	39	3.8
2001	8	19	32.3	48.5	6	3.5
2001	8	21	32.4	48.9	33	3.5
2001	8	23	29.3	51.7	33	3.7
2001	8	23	32.4	49.2	15	4.0
2001	8	24	31.4	50.0	13	3.1
2001	8	24	32.4	48.6	60	4.1
2001	8	24	37.9	43.2	5	4.3
2001	8	25	32.1	47.1	33	4.4
2001	8	29	30.6	48.4	33	3.6
2001	9	1	32.8	47.7	17	5.0
2001	9	2	31.4	46.7	50	4.0
2001	9	2	32.7	47.3	33	3.2
2001	9	2	38.7	40.1	5	4.4
2001	9	3	30.4	51.9	33	3.4
2001	9	5	32.0	48.1	0	3.7
2001	9	5	32.1	47.7	19	3.5
2001	9	9	32.0	46.5	3	3.3
2001	9	9	32.0	47.1	0	3.2
2001	9	9	32.1	46.6	27	3.1
2001	9	12	31.9	47.9	2	3.3
2001	9	12	32.4	47.1	36	3.4
2001	9	13	38.3	42.6	10	4.4

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2001	9	15	32.3	50.3	40	3.6
2001	9	16	30.3	51.6	0	3.5
2001	9	22	30.3	50.8	33	3.5
2001	9	23	32.7	49.1	81	4.3
2001	9	23	39.9	49.2	39	4.0
2001	9	25	38.5	40.7	33	3.8
2001	9	26	31.0	50.0	0	3.9
2001	9	28	30.5	50.9	0	3.0
2001	10	1	28.3	51.4	33	4.2
2001	10	2	31.4	48.5	8	3.2
2001	10	2	39.0	42.3	14	4.1
2001	10	4	29.6	51.9	0	3.4
2001	10	4	31.9	49.2	22	3.8
2001	10	10	39.1	40.1	10	4.1
2001	10	14	37.9	42.8	9	4.7
2001	10	16	29.9	50.5	48	4.7
2001	10	16	33.7	48.3	22	4.1
2001	10	17	33.3	48.9	0	3.6
2001	10	19	32.2	50.4	39	3.6
2001	10	25	32.6	48.0	60	4.5
2001	10	26	28.9	47.7	14	3.1
2001	10	29	38.8	48.6	40	4.8
2001	10	30	30.5	44.5	15	3.7
2001	10	31	30.2	51.8	52	4.2
2001	11	2	27.1	54.6	33	4.7
2001	11	2	39.8	48.7	33	3.6
2001	11	7	29.7	51.5	3	4.2
2001	11	9	30.5	40.2	10	3.4
2001	11	16	30.4	50.4	33	4.4
2001	11	17	28.3	51.9	66	4.1
2001	11	17	30.4	50.1	103	4.0
2001	11	17	30.5	50.5	68	4.8
2001	11	17	35.7	53.3	32	3.6
2001	11	17	38.9	51.6	50	4.7
2001	11	18	26.9	54.6	60	4.1
2001	11	18	29.1	51.5	113	4.4
2001	11	18	30.1	50.0	0	3.7
2001	11	19	30.3	50.1	143	4.3
2001	11	23	28.8	52.0	33	4.3
2001	11	23	34.1	49.9	15	3.9
2001	11	25	35.3	43.6	33	3.9
2001	11	26	35.3	44.7	33	4.8
2001	11	29	33.6	45.9	10	4.6

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2001	12	2	38.6	43.3	15	4.7
2001	12	6	28.2	52.3	33	4.1
2001	12	7	24.6	42.4	624	3.1
2001	12	11	30.2	51.6	89	4.0
2001	12	13	30.3	51.0	15	3.9
2001	12	15	28.2	52.7	26	4.2
2001	12	15	38.7	42.3	35	4.2
2001	12	18	29.8	51.1	20	4.6
2001	12	20	30.0	51.4	0	4.3
2001	12	20	30.6	49.8	33	4.6
2001	12	23	31.7	49.2	0	4.4
2001	12	23	31.8	49.3	48	5.4
2001	12	23	32.0	48.7	33	4.0
2001	12	23	33.4	48.4	10	4.6
2001	12	24	30.2	50.9	62	4.2
2001	12	24	39.9	48.4	13	3.8
2001	12	25	32.9	53.2	33	3.9
2001	12	29	28.9	52.7	0	4.1
2001	12	31	32.4	48.9	33	3.9
2002	1	5	37.5	49.0	23	4.3
2002	1	6	38.3	49.0	59	4.4
2002	1	12	35.6	50.6	33	3.3
2002	1	16	38.7	40.3	5	4.1
2002	1	18	37.5	42.6	35	4.8
2002	1	19	29.6	40.4	10	3.1
2002	1	24	28.0	54.5	15	4.4
2002	1	24	38.1	47.9	10	3.7
2002	1	24	38.2	48.2	33	4.3
2002	1	28	28.5	51.6	13	4.1
2002	2	7	35.1	44.5	10	3.5
2002	2	9	39.2	40.5	10	4.1
2002	2	11	40.0	50.2	64	4.8
2002	2	14	26.8	40.2	10	3.0
2002	2	14	36.9	49.5	10	4.3
2002	2	17	28.0	51.8	15	5.3
2002	2	19	33.3	47.3	33	4.4
2002	2	20	32.6	45.0	15	5.2
2002	2	20	33.6	45.7	39	4.4
2002	2	22	33.1	45.6	33	4.1
2002	2	23	26.9	54.7	35	4.6
2002	2	27	27.2	53.1	5	4.1
2002	2	28	27.4	52.4	33	4.0
2002	2	28	37.3	44.2	25	4.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2002	3	1	32.0	49.2	10	3.8
2002	3	2	32.9	48.2	64	5.0
2002	3	3	32.3	48.7	33	4.1
2002	3	4	26.6	53.7	31	4.4
2002	3	5	38.3	45.2	52	4.3
2002	3	6	32.8	46.4	33	4.2
2002	3	6	32.8	48.0	0	3.9
2002	3	6	38.5	44.4	10	4.3
2002	3	8	36.5	44.7	33	3.9
2002	3	10	27.6	54.4	35	4.9
2002	3	11	23.5	46.2	650	3.2
2002	3	13	30.5	50.8	36	4.4
2002	3	14	39.3	44.2	11	4.7
2002	3	14	39.3	44.6	10	4.0
2002	3	18	28.8	52.6	33	3.9
2002	3	21	33.4	51.9	15	3.0
2002	3	21	34.9	51.4	15	3.1
2002	3	26	29.1	51.0	42	4.7
2002	4	1	32.0	54.9	15	4.3
2002	4	3	37.7	40.4	10	4.1
2002	4	4	28.1	52.7	28	4.3
2002	4	7	38.4	45.3	15	4.7
2002	4	8	36.5	52.0	9	4.7
2002	4	19	36.5	49.8	13	5.2
2002	4	24	32.7	48.4	31	4.4
2002	4	24	34.6	47.4	10	5.4
2002	4	25	28.5	52.2	27	4.1
2002	5	1	35.1	55.0	33	4.2
2002	5	3	36.8	43.6	33	4.7
2002	5	9	30.2	50.9	60	4.7
2002	5	11	28.1	40.4	650	3.4
2002	5	13	35.0	53.7	33	4.2
2002	5	13	35.2	52.9	33	4.1
2002	5	16	29.6	51.5	52	4.5
2002	5	17	29.5	52.0	41	4.8
2002	5	19	24.7	49.4	0	3.0
2002	5	21	36.3	51.6	12	4.2
2002	5	23	34.1	46.6	33	3.8
2002	5	30	32.7	47.7	68	4.2
2002	6	1	29.5	51.3	15	5.0
2002	6	7	30.2	54.1	36	4.3
2002	6	14	30.4	50.4	77	4.7
2002	6	16	29.8	50.9	33	4.6

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2002	6	16	33.7	45.9	0	4.2
2002	6	18	27.1	54.4	33	3.9
2002	6	18	33.2	45.9	33	5.3
2002	6	19	27.4	54.0	33	4.7
2002	6	20	27.9	54.0	21	4.0
2002	6	20	38.0	45.5	10	4.5
2002	6	22	35.6	49.0	11	6.5
2002	6	22	36.3	48.5	10	6.4
2002	6	23	29.1	51.4	51	3.8
2002	6	24	34.0	45.8	29	4.0
2002	6	27	39.0	41.2	8	4.4
2002	6	28	27.6	54.7	66	4.0
2002	6	28	36.2	54.1	33	4.4
2002	7	1	30.9	50.1	15	3.9
2002	7	1	39.9	42.3	10	5.1
2002	7	2	31.2	52.4	15	3.8
2002	7	3	29.0	54.8	15	3.4
2002	7	8	31.8	50.7	20	4.5
2002	7	10	30.2	45.6	0	3.5
2002	7	12	28.5	51.9	21	4.2
2002	7	13	33.3	47.1	16	3.9
2002	7	15	26.5	52.9	143	3.9
2002	7	15	33.0	46.8	33	3.7
2002	7	17	30.6	50.8	33	3.8
2002	7	18	30.1	50.1	0	4.1
2002	7	21	39.4	43.2	10	4.1
2002	7	22	30.6	49.5	172	3.8
2002	7	25	35.6	44.4	33	4.4
2002	7	26	29.7	50.6	0	4.0
2002	7	26	29.8	51.1	0	4.2
2002	7	29	30.2	50.9	0	4.2
2002	7	30	37.8	42.5	7	4.1
2002	8	11	27.1	51.1	0	4.0
2002	8	22	28.8	51.4	46	4.4
2002	8	24	26.7	54.7	33	3.9
2002	8	24	39.5	40.2	10	4.2
2002	8	28	30.7	50.5	4	4.6
2002	8	29	27.7	54.6	33	4.1
2002	8	29	30.1	51.6	39	4.4
2002	9	2	32.1	47.5	33	4.0
2002	9	4	34.0	46.1	57	4.3
2002	9	11	35.0	51.5	15	3.9
2002	9	17	31.4	54.6	15	3.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2002	9	17	36.9	54.7	33	3.8
2002	9	18	31.5	50.2	33	3.3
2002	9	20	31.3	49.9	91	3.9
2002	9	20	31.9	50.0	33	3.0
2002	9	22	34.5	55.0	15	3.7
2002	9	23	34.3	44.7	15	3.2
2002	9	25	32.0	49.3	10	5.6
2002	9	26	32.7	46.8	10	3.1
2002	9	28	30.6	49.6	25	4.2
2002	9	28	32.2	50.0	10	4.0
2002	9	29	30.4	50.7	33	3.5
2002	10	3	32.5	48.9	33	3.2
2002	10	4	30.5	52.6	15	3.6
2002	10	6	28.2	52.9	33	4.3
2002	10	6	39.6	41.9	10	4.1
2002	10	10	34.4	51.7	3	3.7
2002	10	10	35.8	52.3	15	5.7
2002	10	12	29.2	51.5	8	4.8
2002	10	12	34.0	51.0	28	3.5
2002	10	16	29.9	47.7	14	3.1
2002	10	17	39.4	40.4	14	4.8
2002	10	18	36.3	52.4	75	3.8
2002	10	19	28.1	51.9	5	3.7
2002	10	20	32.9	49.5	29	3.5
2002	10	22	32.9	48.2	6	3.5
2002	10	25	30.5	50.8	55	4.3
2002	10	25	33.0	48.9	26	4.6
2002	10	27	33.3	47.6	33	3.4
2002	10	27	34.1	44.2	10	3.4
2002	10	27	34.2	48.2	10	4.4
2002	10	27	34.3	48.0	45	4.3
2002	10	27	34.7	46.0	55	4.1
2002	10	27	34.8	46.5	22	3.1
2002	10	29	28.6	52.6	4	3.6
2002	10	29	31.5	51.9	33	4.1
2002	11	2	38.9	42.6	6	4.1
2002	11	4	28.7	52.0	21	3.7
2002	11	4	29.8	51.5	33	3.7
2002	11	4	31.2	50.2	40	3.1
2002	11	7	30.3	48.5	3	3.2
2002	11	8	27.7	52.3	33	4.2
2002	11	10	35.4	44.7	10	4.2
2002	11	11	32.5	49.9	0	3.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2002	11	13	34.4	47.5	69	3.8
2002	11	14	28.2	51.4	33	4.2
2002	11	14	32.3	51.0	40	3.1
2002	11	15	32.4	49.1	31	3.1
2002	11	22	34.9	49.2	15	3.3
2002	11	23	31.6	47.1	33	3.7
2002	11	24	30.8	49.7	14	3.8
2002	11	25	31.2	49.9	33	3.8
2002	11	25	38.3	44.9	10	4.1
2002	11	26	28.6	51.5	16	3.9
2002	11	27	27.2	53.4	30	4.1
2002	11	27	28.1	51.4	2	3.1
2002	11	27	29.9	50.2	6	3.2
2002	11	27	31.0	50.5	33	3.5
2002	11	28	33.3	49.1	39	3.2
2002	11	29	32.0	51.4	33	3.7
2002	11	29	32.0	48.4	8	3.7
2002	12	1	30.1	50.5	33	4.0
2002	12	3	28.3	53.1	56	4.5
2002	12	8	33.8	45.8	33	4.7
2002	12	9	34.9	50.9	15	3.8
2002	12	9	36.5	45.1	46	4.6
2002	12	9	36.6	44.4	10	5.1
2002	12	10	31.4	49.6	39	3.1
2002	12	12	28.0	53.7	36	3.9
2002	12	17	36.9	45.6	10	4.2
2002	12	18	28.3	53.7	33	3.8
2002	12	18	30.1	50.2	33	3.2
2002	12	19	28.0	54.4	33	3.9
2002	12	22	33.2	47.2	15	3.2
2002	12	24	34.5	47.5	45	5.2
2002	12	24	34.6	47.3	16	3.6
2002	12	25	29.3	51.9	33	3.8
2002	12	27	34.7	47.8	14	3.5
2002	12	28	31.2	50.2	9	3.8
2002	12	30	31.8	49.8	12	3.7
2002	12	31	31.0	50.2	54	4.5
2003	1	1	26.8	53.8	0	3.8
2003	1	1	27.2	53.3	0	3.8
2003	1	1	31.8	49.4	33	4.7
2003	1	2	31.9	50.0	33	3.7
2003	1	5	30.2	51.9	33	3.2
2003	1	5	30.2	51.3	1	3.4

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2003	1	5	34.0	45.5	53	4.5
2003	1	5	34.8	45.0	10	3.9
2003	1	7	28.4	52.8	44	4.3
2003	1	7	28.9	53.0	33	3.9
2003	1	7	29.1	47.6	4	3.1
2003	1	7	38.5	40.5	10	4.3
2003	1	9	33.4	44.5	4	3.0
2003	1	12	29.9	51.8	40	3.7
2003	1	12	34.8	46.0	33	4.4
2003	1	13	38.9	49.2	33	4.2
2003	1	16	30.5	50.5	58	4.7
2003	1	22	30.7	51.1	33	3.4
2003	1	25	29.2	51.4	49	4.2
2003	1	25	39.3	40.8	10	4.1
2003	1	30	32.2	49.2	24	4.5
2003	1	30	37.9	42.9	10	4.1
2003	2	2	30.0	52.8	55	4.6
2003	2	4	29.0	50.7	33	3.2
2003	2	8	29.8	51.1	37	3.4
2003	2	8	31.6	48.4	33	3.5
2003	2	8	31.7	49.8	39	4.0
2003	2	9	31.4	49.4	10	4.0
2003	2	9	33.8	47.2	21	3.3
2003	2	11	26.7	54.7	33	3.5
2003	2	13	34.0	48.6	19	3.8
2003	2	14	30.0	53.7	15	4.4
2003	2	20	38.4	45.0	65	4.4
2003	2	20	39.5	43.9	8	4.2
2003	2	21	34.5	46.6	62	3.7
2003	2	27	38.3	44.2	12	4.3
2003	3	1	26.9	54.7	65	4.1
2003	3	5	27.5	52.9	33	4.1
2003	3	6	37.5	44.9	10	4.7
2003	3	10	38.5	40.5	7	4.1
2003	3	11	31.0	50.4	33	3.4
2003	3	13	30.7	51.5	16	3.6
2003	3	16	28.5	53.0	75	4.8
2003	3	16	36.5	44.3	10	3.8
2003	3	16	36.8	44.2	33	5.2
2003	3	16	37.8	44.8	30	4.5
2003	3	22	31.9	50.5	18	3.8
2003	3	23	33.5	49.7	39	3.5
2003	3	24	30.7	54.4	0	3.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2003	3	24	37.4	42.7	10	4.1
2003	3	25	29.6	52.9	33	3.7
2003	3	25	32.6	49.0	33	3.2
2003	3	27	31.2	51.3	44	4.6
2003	3	30	27.4	54.3	10	3.7
2003	3	30	37.4	54.4	30	5.1
2003	4	3	31.4	50.3	33	3.4
2003	4	3	33.6	44.1	15	3.4
2003	4	8	30.4	50.9	40	3.3
2003	4	8	31.5	49.5	33	3.0
2003	4	8	32.9	48.0	49	4.5
2003	4	8	39.0	42.5	10	3.7
2003	4	11	37.9	43.9	32	4.1
2003	4	11	38.1	44.6	37	4.0
2003	4	15	31.1	50.4	33	3.4
2003	4	15	35.9	45.0	69	3.8
2003	4	18	30.5	51.6	29	3.7
2003	4	18	32.1	47.3	0	3.0
2003	4	18	39.0	41.7	2	4.1
2003	4	19	31.0	50.1	4	3.2
2003	4	20	32.4	49.5	33	3.6
2003	4	21	30.7	48.4	6	3.6
2003	4	22	29.7	50.8	63	3.9
2003	4	22	29.9	50.8	28	3.5
2003	4	25	38.7	43.0	5	4.5
2003	4	29	28.5	52.4	11	4.3
2003	4	29	35.0	47.5	15	3.3
2003	5	1	39.0	40.5	14	6.3
2003	5	2	37.6	49.3	76	4.0
2003	5	2	38.1	41.2	6	4.1
2003	5	3	29.0	51.4	41	3.8
2003	5	4	27.0	54.0	34	4.1
2003	5	8	27.3	54.3	33	4.8
2003	5	8	31.7	49.8	33	3.3
2003	5	9	26.4	54.3	33	4.0
2003	5	9	27.6	54.3	0	3.9
2003	5	9	27.8	54.5	33	4.2
2003	5	11	29.4	51.8	33	4.5
2003	5	11	38.5	40.9	12	4.1
2003	5	12	28.3	54.5	10	3.8
2003	5	12	30.8	50.8	43	4.3
2003	5	12	33.4	47.2	39	3.4
2003	5	13	33.6	49.0	33	3.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2003	5	20	27.4	54.6	0	3.8
2003	5	20	33.4	49.0	7	3.5
2003	5	25	31.4	48.6	33	3.3
2003	5	26	29.7	51.1	33	3.7
2003	5	26	31.8	50.4	8	4.0
2003	5	27	29.5	51.3	14	5.3
2003	5	27	29.8	50.2	21	3.3
2003	6	5	38.5	44.2	23	4.4
2003	6	5	38.6	45.1	69	4.4
2003	6	6	27.9	52.1	41	4.2
2003	6	8	29.0	47.8	10	3.1
2003	6	9	28.6	52.6	33	4.5
2003	6	9	29.7	52.1	10	3.7
2003	6	11	37.5	42.6	10	4.3
2003	6	13	32.3	49.5	38	3.1
2003	6	14	28.5	54.9	10	3.7
2003	6	15	28.8	51.0	3	3.0
2003	6	15	30.9	50.0	0	3.2
2003	6	21	35.6	52.9	24	4.4
2003	6	22	32.5	47.4	39	3.3
2003	6	22	35.4	52.7	33	4.3
2003	6	22	36.2	52.8	15	4.4
2003	6	24	33.1	49.5	46	4.7
2003	6	25	33.0	50.0	18	3.6
2003	6	25	37.8	43.1	10	4.2
2003	6	28	31.0	50.2	96	3.2
2003	6	28	31.6	47.3	0	3.8
2003	6	29	28.4	51.8	10	3.8
2003	6	29	30.5	50.8	75	3.0
2003	7	5	33.3	53.9	0	3.6
2003	7	7	28.8	48.2	12	3.4
2003	7	9	32.4	49.4	39	3.4
2003	7	10	28.3	54.2	20	5.7
2003	7	10	29.2	54.3	0	3.9
2003	7	11	33.0	47.5	10	4.1
2003	7	11	33.6	49.5	11	4.5
2003	7	12	27.7	54.0	0	4.1
2003	7	12	28.5	53.4	68	4.1
2003	7	13	28.0	53.6	0	4.0
2003	7	13	28.4	53.7	10	3.9
2003	7	13	32.2	47.5	15	4.4
2003	7	14	29.1	47.5	3	3.1
2003	7	14	31.9	51.1	40	3.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2003	7	18	30.3	50.4	0	3.0
2003	7	20	27.0	53.9	0	3.8
2003	7	22	38.7	42.6	6	4.2
2003	7	24	28.4	51.7	40	3.5
2003	7	28	23.5	46.1	57	3.0
2003	7	29	32.8	47.6	46	4.2
2003	7	31	38.2	42.7	5	4.1
2003	8	1	33.2	46.2	33	4.1
2003	8	2	28.9	40.6	10	3.5
2003	8	6	33.3	45.0	11	3.0
2003	8	8	33.2	46.9	15	4.0
2003	8	12	29.9	51.5	33	3.3
2003	8	18	40.0	47.4	12	4.1
2003	8	20	29.5	52.7	3	3.2
2003	8	22	28.5	53.6	0	3.9
2003	8	23	28.5	52.3	0	3.9
2003	8	23	33.8	42.9	15	3.6
2003	8	24	32.3	50.1	33	4.2
2003	8	28	27.5	54.0	0	4.1
2003	8	29	28.4	51.5	27	4.8
2003	8	29	32.6	48.2	10	4.6
2003	8	30	27.9	40.2	650	3.5
2003	8	30	31.7	49.2	0	3.1
2003	8	31	32.7	48.6	3	3.5
2003	9	1	29.3	50.6	73	3.8
2003	9	1	29.9	51.4	39	3.2
2003	9	1	32.9	46.7	44	4.0
2003	9	6	31.1	48.8	5	3.3
2003	9	12	32.4	48.8	12	4.1
2003	9	15	28.0	54.8	49	4.3
2003	9	18	30.0	47.9	12	3.4
2003	9	23	29.8	51.6	33	3.5
2003	9	25	32.8	46.4	128	3.3
2003	9	29	29.6	50.7	29	3.4
2003	9	30	36.4	53.4	33	4.1
2003	10	2	28.7	40.5	650	3.1
2003	10	2	29.5	52.6	38	4.0
2003	10	3	29.6	51.7	30	4.8
2003	10	3	29.7	52.0	14	4.2
2003	10	3	31.0	50.2	12	4.2
2003	10	4	34.6	45.6	6	3.5
2003	10	4	36.4	42.7	33	4.3
2003	10	5	30.2	50.6	1	4.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2003	10	7	32.8	49.5	6	4.1
2003	10	11	32.4	49.2	0	3.0
2003	10	11	34.6	54.9	10	4.4
2003	10	12	27.0	53.5	9	4.1
2003	10	13	23.0	42.9	114	3.1
2003	10	13	29.0	47.6	14	3.1
2003	10	13	39.1	41.5	10	4.3
2003	10	14	32.8	47.4	29	4.1
2003	10	16	32.4	50.3	12	3.1
2003	10	20	38.6	44.6	10	4.9
2003	10	20	38.9	43.7	8	4.6
2003	10	23	28.0	52.5	10	3.9
2003	10	23	37.4	42.7	8	4.7
2003	10	26	28.1	52.2	10	4.0
2003	11	1	32.5	52.2	0	4.2
2003	11	6	31.8	50.6	33	3.5
2003	11	8	30.6	46.4	33	3.7
2003	11	18	31.0	51.3	33	4.6
2003	11	18	39.3	44.7	31	4.1
2003	11	19	31.2	51.7	86	3.7
2003	11	24	30.8	50.1	38	3.6
2003	11	24	31.3	51.3	33	3.3
2003	11	25	29.0	51.6	33	4.0
2003	11	26	30.6	50.4	22	3.1
2003	11	26	30.7	50.6	33	3.3
2003	11	27	27.7	51.7	33	4.2
2003	11	28	30.5	50.9	38	3.2
2003	12	2	36.0	52.7	28	3.8
2003	12	2	40.0	41.5	17	4.1
2003	12	3	28.1	52.4	33	4.2
2003	12	8	28.7	53.5	33	3.9
2003	12	8	31.6	49.4	14	3.3
2003	12	8	31.9	49.4	134	3.0
2003	12	9	30.5	49.9	33	4.6
2003	12	10	28.9	47.8	13	3.2
2003	12	11	32.5	49.2	48	4.4
2003	12	17	36.6	40.9	1	4.2
2003	12	18	29.2	50.5	33	4.1
2003	12	18	29.4	50.8	33	4.3
2003	12	18	29.6	50.8	10	4.2
2003	12	18	29.8	50.9	33	3.5
2003	12	21	30.5	50.6	10	4.0
2003	12	23	28.8	54.4	33	4.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2003	12	24	34.9	50.7	15	4.7
2003	12	27	28.8	47.8	19	3.1
2003	12	28	33.0	47.1	14	3.5
2003	12	30	28.9	53.9	10	3.5
2003	12	31	32.9	46.7	33	4.6
2004	1	3	28.7	54.3	0	4.0
2004	1	4	39.2	42.2	8	4.1
2004	1	6	30.1	51.6	33	3.4
2004	1	6	31.5	49.4	0	4.2
2004	1	6	31.9	49.6	61	5.0
2004	1	6	31.9	49.5	0	4.6
2004	1	6	32.4	49.5	0	4.2
2004	1	7	23.5	40.2	95	3.3
2004	1	7	30.4	50.9	33	3.6
2004	1	7	31.3	48.9	0	4.2
2004	1	8	34.2	48.0	33	3.6
2004	1	10	37.8	43.3	7	4.4
2004	1	12	30.0	50.0	0	4.0
2004	1	14	27.7	52.4	33	5.8
2004	1	15	29.3	51.4	40	3.3
2004	1	16	26.9	52.7	0	3.9
2004	1	18	31.9	51.8	63	4.9
2004	1	18	32.1	51.5	15	4.2
2004	1	18	32.9	48.6	33	3.1
2004	1	22	29.6	51.2	33	5.0
2004	1	24	30.1	49.6	40	4.3
2004	1	24	38.3	44.8	4	4.5
2004	1	24	38.7	43.3	4	4.6
2004	1	24	38.9	44.3	33	4.8
2004	1	26	29.3	53.7	30	4.8
2004	1	27	28.7	53.5	40	4.6
2004	1	28	31.6	49.7	0	4.3
2004	1	28	32.2	51.8	0	4.0
2004	1	30	28.4	52.5	0	4.3
2004	1	30	29.3	49.1	10	3.8
2004	1	31	28.1	52.5	0	4.1
2004	1	31	32.4	50.0	33	3.4
2004	2	1	37.0	42.4	10	4.2
2004	2	6	32.0	52.2	33	4.4
2004	2	8	33.9	45.4	53	4.8
2004	2	9	31.8	50.2	89	4.2
2004	2	12	33.3	45.3	19	3.2
2004	2	12	33.5	45.8	0	3.9

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2004	2	12	33.7	45.9	88	5.1
2004	2	16	34.5	47.8	39	4.0
2004	2	18	28.8	48.9	9	3.8
2004	2	25	27.9	52.1	0	4.1
2004	2	28	29.4	51.8	40	3.0
2004	2	29	32.8	48.1	36	4.1
2004	3	1	32.6	47.5	94	3.0
2004	3	2	28.8	51.2	7	3.5
2004	3	2	29.0	51.2	36	5.1
2004	3	4	31.5	50.8	34	4.2
2004	3	4	33.2	48.2	0	4.2
2004	3	5	36.6	43.4	5	4.3
2004	3	7	37.1	54.9	33	4.5
2004	3	7	39.5	54.8	12	4.4
2004	3	7	39.6	52.6	15	4.2
2004	3	13	26.8	53.0	0	4.0
2004	3	15	34.8	46.1	17	3.5
2004	3	18	26.1	53.5	0	3.8
2004	3	18	35.3	46.3	65	4.4
2004	3	19	32.6	49.0	33	5.0
2004	3	19	32.8	48.9	0	3.9
2004	3	19	35.6	48.8	33	4.0
2004	3	21	31.1	52.2	9	3.9
2004	3	21	33.0	49.4	0	4.3
2004	3	25	39.9	40.9	10	5.6
2004	3	28	39.5	40.8	25	4.1
2004	3	28	39.8	54.2	5	4.5
2004	3	30	29.6	52.0	61	4.5
2004	3	31	29.5	52.3	39	3.7
2004	3	31	30.4	51.3	33	3.1
2004	3	31	37.5	43.7	14	3.8
2004	4	1	33.5	49.3	33	3.2
2004	4	2	30.0	51.8	38	3.1
2004	4	2	32.9	48.9	38	3.1
2004	4	6	36.6	42.3	10	4.2
2004	4	9	29.8	51.9	0	3.9
2004	4	11	39.0	43.8	8	4.1
2004	4	12	30.1	51.1	33	3.5
2004	4	14	38.7	52.0	15	4.3
2004	4	14	39.8	52.5	41	3.9
2004	4	15	30.7	50.7	39	3.1
2004	4	16	33.8	48.5	0	3.9
2004	4	17	38.1	41.3	6	4.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2004	4	17	38.6	48.8	0	3.8
2004	4	17	38.6	49.6	10	3.9
2004	4	20	30.7	52.8	40	3.3
2004	4	21	27.6	53.7	0	4.4
2004	4	22	28.8	47.6	15	3.1
2004	4	25	31.1	50.1	46	3.6
2004	4	25	33.2	46.4	0	3.8
2004	4	26	38.5	42.0	5	3.9
2004	4	29	38.4	49.0	33	3.9
2004	4	30	27.7	53.2	0	4.5
2004	5	4	28.2	52.6	44	3.7
2004	5	5	29.7	52.1	15	4.2
2004	5	6	34.7	47.0	70	3.9
2004	5	7	29.8	51.4	0	3.9
2004	5	8	29.9	51.5	67	5.3
2004	5	14	30.7	50.3	44	4.1
2004	5	15	31.4	49.1	41	3.9
2004	5	18	38.5	44.7	10	3.3
2004	5	24	32.1	41.7	15	4.9
2004	5	24	34.1	46.7	44	4.9
2004	5	27	31.8	51.8	0	4.1
2004	5	28	36.3	51.6	27	6.3
2004	5	28	36.6	51.1	13	4.7
2004	5	30	32.2	49.3	50	4.8
2004	5	30	32.9	46.4	0	4.4
2004	6	3	34.0	45.4	12	3.8
2004	6	4	36.1	53.6	2	4.3
2004	6	6	37.7	42.8	5	4.4
2004	6	7	34.3	49.9	4	3.7
2004	6	7	34.8	45.0	0	3.7
2004	6	9	33.3	46.8	15	3.3
2004	6	9	33.5	43.5	15	4.4
2004	6	11	27.8	53.1	48	4.7
2004	6	12	32.3	49.7	26	3.5
2004	6	12	33.3	45.9	48	5.0
2004	6	12	37.8	40.5	15	4.3
2004	6	13	29.5	50.8	40	4.7
2004	6	13	34.4	46.1	0	3.3
2004	6	14	36.3	50.0	10	3.9
2004	6	16	24.3	49.4	0	3.2
2004	6	18	27.5	54.8	0	3.9
2004	6	23	32.5	47.1	0	3.3
2004	6	25	24.0	49.5	0	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2004	6	25	30.6	50.7	33	5.0
2004	7	1	39.7	43.9	15	5.1
2004	7	2	35.7	48.7	10	4.4
2004	7	6	31.5	45.7	260	4.0
2004	7	7	27.3	53.5	71	4.1
2004	7	7	34.3	51.5	18	3.2
2004	7	8	39.5	41.1	7	4.1
2004	7	10	31.5	50.1	14	3.9
2004	7	12	37.3	54.3	28	3.9
2004	7	17	32.9	48.7	47	4.6
2004	7	18	30.6	50.3	14	3.7
2004	7	22	38.6	41.6	57	3.7
2004	7	25	31.5	45.4	39	3.1
2004	7	25	32.7	49.9	0	3.8
2004	7	29	36.4	44.5	5	4.3
2004	7	30	39.7	44.6	23	4.6
2004	8	2	24.7	49.7	0	3.3
2004	8	5	31.8	46.1	0	4.7
2004	8	9	24.4	49.4	0	3.4
2004	8	16	30.3	51.7	2	4.2
2004	8	16	37.5	44.9	33	3.9
2004	8	16	38.0	43.3	22	4.4
2004	8	18	28.9	47.7	7	3.7
2004	8	21	35.4	49.4	10	4.3
2004	8	22	39.0	42.3	3	4.1
2004	8	23	36.0	45.2	10	3.8
2004	8	23	36.3	44.9	10	3.8
2004	8	27	28.5	51.6	40	3.9
2004	8	28	32.4	47.0	14	3.6
2004	8	28	32.4	46.0	72	4.6
2004	8	28	32.8	46.5	33	4.0
2004	8	28	33.5	46.7	238	3.6
2004	8	29	31.5	50.6	38	3.3
2004	8	30	27.3	52.7	18	3.7
2004	8	31	28.6	53.4	79	4.6
2004	8	31	28.6	53.6	42	3.9
2004	8	31	28.7	53.6	14	4.2
2004	9	1	28.1	54.1	70	4.9
2004	9	2	35.6	54.4	14	4.3
2004	9	3	26.9	54.6	0	4.4
2004	9	5	38.3	45.5	10	4.0
2004	9	9	24.9	49.4	7	3.8
2004	9	10	31.3	50.5	15	3.5

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2004	9	14	29.9	53.6	0	3.8
2004	9	15	33.3	48.5	6	4.4
2004	9	17	28.6	52.8	35	4.0
2004	9	17	31.8	52.1	25	3.1
2004	9	18	39.9	40.2	5	4.1
2004	9	19	28.9	47.9	14	3.2
2004	9	21	31.5	51.4	40	3.4
2004	9	22	28.3	52.5	10	4.0
2004	9	22	29.2	52.2	30	3.2
2004	9	24	35.1	52.7	48	4.1
2004	9	24	35.6	52.3	16	4.2
2004	9	25	29.8	49.2	1	3.8
2004	9	25	33.0	49.9	14	3.6
2004	9	26	32.1	50.6	33	3.1
2004	9	26	38.5	43.2	14	4.4
2004	9	27	32.7	48.9	14	3.5
2004	9	28	27.0	54.5	33	4.5
2004	9	28	30.7	51.8	33	3.5
2004	9	30	27.3	54.0	0	3.9
2004	9	30	28.3	54.2	0	3.9
2004	9	30	32.4	47.5	39	3.1
2004	10	2	39.2	53.7	61	3.5
2004	10	5	35.8	45.7	25	4.3
2004	10	5	36.8	41.2	9	4.3
2004	10	5	37.0	45.5	136	4.9
2004	10	7	37.2	54.4	33	5.6
2004	10	9	31.6	50.9	8	4.6
2004	10	14	27.6	53.4	34	3.3
2004	10	14	28.1	51.5	7	3.6
2004	10	14	30.9	50.0	36	4.1
2004	10	15	32.7	48.0	39	3.1
2004	10	16	33.6	46.1	38	3.3
2004	10	17	35.6	49.0	10	4.5
2004	10	23	32.6	50.1	15	3.9
2004	10	24	38.2	43.8	5	4.2
2004	10	25	34.7	50.6	7	4.0
2004	10	30	36.7	44.5	5	4.4
2004	10	31	30.5	49.9	18	4.2
2004	10	31	31.0	49.7	143	3.3
2004	11	3	29.7	51.2	15	3.7
2004	11	5	29.8	50.7	14	4.0
2004	11	6	28.4	51.2	40	4.6
2004	11	6	28.7	51.5	33	4.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2004	11	7	33.4	47.7	70	4.7
2004	11	7	37.9	48.9	14	3.5
2004	11	7	38.6	49.5	14	3.8
2004	11	9	30.9	50.8	10	4.2
2004	11	9	34.3	48.1	18	3.7
2004	11	10	23.7	40.8	650	4.0
2004	11	10	32.8	47.1	35	4.0
2004	11	11	27.3	52.6	14	3.3
2004	11	11	28.5	51.9	17	3.1
2004	11	14	31.8	49.7	14	3.3
2004	11	16	29.5	51.5	0	4.4
2004	11	16	31.2	50.1	34	3.2
2004	11	17	26.3	53.7	18	3.2
2004	11	19	30.6	50.5	0	4.7
2004	11	20	28.5	54.2	10	4.5
2004	11	20	29.8	46.7	10	4.3
2004	11	20	31.9	48.7	16	5.0
2004	11	20	32.2	48.8	39	4.9
2004	11	21	33.3	47.9	18	5.2
2004	11	22	28.1	51.4	26	4.1
2004	11	26	29.9	51.4	14	3.8
2004	11	26	32.7	49.7	14	3.3
2004	11	26	32.8	49.4	18	3.3
2004	11	26	35.8	40.4	28	4.4
2004	11	30	34.1	48.0	18	3.2
2004	12	1	31.7	49.1	18	3.2
2004	12	1	32.0	49.2	17	3.2
2004	12	1	32.8	49.1	10	3.2
2004	12	1	39.4	53.9	9	4.4
2004	12	2	32.1	49.8	14	3.5
2004	12	4	32.9	40.1	0	3.3
2004	12	5	30.3	50.8	15	3.5
2004	12	5	30.3	50.5	25	3.9
2004	12	5	34.5	53.4	14	3.2
2004	12	7	32.7	50.1	14	3.3
2004	12	9	28.3	54.5	35	4.2
2004	12	10	27.6	53.8	8	4.0
2004	12	12	29.5	52.5	12	3.5
2004	12	14	31.1	50.3	33	3.0
2004	12	14	33.1	47.5	42	3.2
2004	12	15	28.1	54.9	0	3.8
2004	12	16	32.3	47.6	38	3.8
2004	12	18	28.0	53.8	14	3.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2004	12	19	31.0	54.9	14	3.1
2004	12	22	29.6	50.9	14	4.0
2004	12	22	30.5	44.2	301	3.3
2004	12	22	31.1	51.1	14	3.7
2004	12	26	29.8	50.4	15	3.3
2004	12	29	31.6	49.1	30	3.8
2004	12	29	32.5	48.3	31	3.5
2004	12	29	32.8	48.0	38	3.2
2004	12	30	38.7	43.9	9	3.9
2004	12	31	28.4	53.2	16	4.6
2005	1	1	36.2	53.4	3	3.4
2005	1	1	36.9	49.5	10	4.9
2005	1	1	38.1	42.7	28	4.0
2005	1	3	37.1	44.9	10	4.6
2005	1	4	37.8	47.5	6	4.0
2005	1	5	38.6	51.2	24	4.6
2005	1	5	40.0	51.0	29	5.4
2005	1	10	32.5	48.8	0	4.0
2005	1	13	30.7	50.3	63	4.1
2005	1	13	33.3	48.5	14	4.4
2005	1	13	35.5	53.3	10	4.7
2005	1	15	28.6	52.5	17	4.0
2005	1	15	29.8	52.0	10	3.2
2005	1	15	30.4	50.5	49	4.5
2005	1	16	37.9	47.0	14	4.8
2005	1	17	36.9	55.0	10	4.0
2005	1	18	32.3	49.7	28	4.9
2005	1	18	32.7	48.3	2	3.0
2005	1	18	39.7	48.6	10	3.9
2005	1	20	30.7	49.8	10	3.9
2005	1	23	40.0	40.7	5	4.1
2005	1	24	31.5	50.9	5	4.0
2005	1	24	32.7	45.0	10	4.2
2005	1	24	32.9	45.5	8	4.1
2005	1	24	34.2	45.4	70	4.0
2005	1	25	31.8	45.1	10	4.6
2005	1	25	33.4	45.9	49	4.9
2005	1	25	37.7	43.7	15	5.9
2005	1	26	33.8	46.7	20	4.4
2005	1	26	37.7	44.4	6	4.4
2005	1	29	27.9	53.0	24	4.5
2005	1	29	36.0	52.4	5	4.2
2005	1	30	38.9	44.7	4	4.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2005	1	31	26.5	53.7	36	3.9
2005	1	31	26.7	53.8	10	3.9
2005	1	31	28.7	51.9	120	3.9
2005	2	2	28.8	53.0	15	3.4
2005	2	2	37.8	43.2	10	5.0
2005	2	2	38.2	42.4	10	3.6
2005	2	2	39.3	44.5	10	4.2
2005	2	3	30.1	51.0	23	3.7
2005	2	4	38.1	43.5	2	4.9
2005	2	5	32.2	49.2	10	4.1
2005	2	6	35.5	52.6	18	3.8
2005	2	8	32.8	49.5	14	4.9
2005	2	8	32.9	48.3	26	3.4
2005	2	10	28.4	52.2	2	4.2
2005	2	10	28.6	51.3	28	3.7
2005	2	10	29.2	51.7	36	4.2
2005	2	10	31.0	49.9	48	4.0
2005	2	11	35.1	53.8	10	3.9
2005	2	12	27.9	53.9	55	4.0
2005	2	14	30.0	51.8	30	4.1
2005	2	19	33.9	48.4	10	3.6
2005	2	20	36.6	53.0	30	4.2
2005	2	21	35.5	53.8	10	3.6
2005	2	21	35.8	54.5	0	3.3
2005	2	25	34.2	53.4	10	4.0
2005	2	27	32.3	49.3	51	4.5
2005	3	1	26.8	54.6	18	4.2
2005	3	5	40.0	48.7	33	3.7
2005	3	6	30.7	54.1	16	3.3
2005	3	6	38.9	48.6	32	4.0
2005	3	7	31.8	51.0	10	3.7
2005	3	8	27.7	54.4	29	4.5
2005	3	8	28.4	54.1	25	4.3
2005	3	11	24.3	49.2	10	4.0
2005	3	11	26.9	54.0	42	4.9
2005	3	13	30.7	50.0	43	4.5
2005	3	13	32.0	49.4	14	3.9
2005	3	14	37.8	44.3	48	4.0
2005	3	15	36.3	53.8	25	3.8
2005	3	17	30.2	52.6	17	3.5
2005	3	17	32.8	48.4	14	3.9
2005	3	18	34.3	48.2	10	3.6
2005	3	21	31.6	50.0	6	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2005	3	21	38.1	48.0	18	3.9
2005	3	21	39.7	49.5	10	4.3
2005	3	22	31.6	50.1	49	4.3
2005	3	25	34.9	50.0	14	4.2
2005	3	25	35.4	50.0	150	5.1
2005	3	25	39.9	40.8	33	4.3
2005	3	27	31.8	51.4	23	3.7
2005	3	27	31.9	52.1	23	3.7
2005	3	28	29.1	52.9	18	3.9
2005	3	30	38.4	44.0	23	3.8
2005	4	1	34.3	45.7	14	4.1
2005	4	2	27.6	53.8	10	3.3
2005	4	4	38.5	50.4	13	3.7
2005	4	4	40.0	50.1	64	3.8
2005	4	6	34.7	47.0	10	3.6
2005	4	6	34.8	45.9	1	3.7
2005	4	6	37.6	49.8	10	3.2
2005	4	6	38.0	49.0	20	4.3
2005	4	7	32.5	45.7	10	3.5
2005	4	7	33.0	46.5	48	4.5
2005	4	8	35.5	49.1	10	3.8
2005	4	10	33.2	45.6	8	3.3
2005	4	10	34.1	45.4	10	3.6
2005	4	10	34.5	51.0	20	4.8
2005	4	11	39.6	49.3	53	4.3
2005	4	12	34.3	48.1	18	3.5
2005	4	14	38.8	44.6	5	3.5
2005	4	15	31.8	50.9	16	4.0
2005	4	18	39.9	54.1	33	4.1
2005	4	20	36.3	45.7	6	3.3
2005	4	21	33.0	47.4	10	3.5
2005	4	23	39.7	44.3	10	4.1
2005	4	26	35.1	46.3	44	4.1
2005	4	28	35.9	53.3	10	3.7
2005	4	29	35.3	53.5	16	3.4
2005	4	30	28.4	51.5	10	3.7
2005	5	1	33.8	48.7	8	4.9
2005	5	5	29.2	50.2	43	4.1
2005	5	8	27.7	53.9	10	3.6
2005	5	8	38.5	48.5	47	3.4
2005	5	9	29.0	50.2	15	3.7
2005	5	9	29.8	50.9	15	3.9
2005	5	11	30.9	51.6	2	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2005	5	11	34.4	45.2	10	3.3
2005	5	11	35.3	45.1	10	4.2
2005	5	12	36.1	54.8	10	3.7
2005	5	13	26.6	54.8	41	4.1
2005	5	13	28.1	54.1	10	3.5
2005	5	13	28.7	54.0	14	3.3
2005	5	13	35.2	51.5	7	3.3
2005	5	13	35.2	46.2	10	4.3
2005	5	15	36.4	54.4	14	3.3
2005	5	18	29.8	51.7	22	3.9
2005	5	18	31.6	48.9	14	3.6
2005	5	19	27.8	52.6	10	4.3
2005	5	19	27.9	54.8	10	3.5
2005	5	19	31.7	50.2	10	4.1
2005	5	19	37.4	53.7	10	3.8
2005	5	20	32.8	48.0	28	3.5
2005	5	21	29.6	51.2	38	4.3
2005	5	21	38.6	48.7	9	3.3
2005	5	24	33.3	46.5	11	3.8
2005	5	24	33.8	53.9	7	4.0
2005	5	24	36.1	44.9	18	3.5
2005	5	26	32.2	50.2	46	3.5
2005	5	26	38.7	48.8	37	4.1
2005	5	27	30.6	50.1	65	3.6
2005	5	28	29.3	53.8	18	3.9
2005	5	29	37.0	42.1	23	4.0
2005	5	29	38.7	42.1	33	4.1
2005	6	1	27.5	54.4	57	4.1
2005	6	1	34.2	48.2	11	3.7
2005	6	1	35.5	53.1	13	3.7
2005	6	5	38.1	42.2	33	4.8
2005	6	6	39.3	41.0	3	5.7
2005	6	7	30.5	50.4	25	3.3
2005	6	7	38.0	46.8	9	4.4
2005	6	8	28.6	52.6	27	3.6
2005	6	8	31.8	49.1	10	4.1
2005	6	8	32.8	48.4	18	3.2
2005	6	8	34.4	46.9	5	3.4
2005	6	8	36.2	54.2	10	4.0
2005	6	11	31.9	51.9	5	3.9
2005	6	12	35.7	48.9	39	3.5
2005	6	14	27.3	53.8	18	4.7
2005	6	18	33.0	48.4	46	4.5

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2005	6	20	33.8	47.1	10	3.4
2005	6	22	28.3	53.1	35	4.5
2005	6	22	33.6	45.4	7	4.5
2005	6	22	33.8	45.8	14	4.0
2005	6	22	37.9	47.6	21	3.7
2005	6	22	38.1	47.9	10	4.0
2005	6	23	34.3	46.4	15	3.4
2005	6	24	31.1	50.1	2	3.7
2005	6	24	35.1	52.1	18	3.6
2005	6	26	29.8	51.7	14	4.5
2005	6	28	31.5	51.2	45	3.4
2005	6	28	32.1	51.1	10	3.6
2005	6	28	32.1	51.5	10	3.3
2005	6	28	32.6	47.7	10	3.6
2005	6	30	30.9	49.6	15	4.0
2005	6	30	31.0	49.8	51	4.3
2005	7	6	33.3	46.7	10	4.0
2005	7	8	27.3	52.6	10	4.3
2005	7	8	29.6	52.2	5	3.8
2005	7	8	38.5	41.4	9	4.3
2005	7	9	35.8	45.7	10	4.0
2005	7	9	38.4	42.0	10	4.2
2005	7	10	28.4	54.2	10	3.7
2005	7	10	39.9	40.9	30	4.1
2005	7	11	34.5	50.5	10	4.0
2005	7	11	38.7	44.7	1	4.1
2005	7	12	27.8	54.0	22	3.3
2005	7	12	39.8	44.7	10	3.7
2005	7	16	26.7	54.4	10	3.5
2005	7	17	24.0	49.4	10	4.0
2005	7	18	29.4	51.9	23	4.2
2005	7	19	35.6	50.0	10	4.9
2005	7	22	31.6	50.2	8	4.3
2005	7	22	38.6	40.9	10	4.1
2005	7	24	29.9	50.6	52	3.7
2005	7	24	35.7	48.8	8	4.0
2005	7	26	29.8	52.6	14	3.8
2005	7	26	35.5	49.1	10	3.3
2005	7	27	26.7	54.9	15	4.1
2005	7	28	27.4	54.8	10	4.0
2005	7	30	36.3	52.5	10	3.7
2005	7	30	37.9	43.0	1	4.0
2005	7	31	26.9	54.7	10	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2005	8	1	30.5	50.8	63	4.0
2005	8	1	35.3	51.0	6	3.3
2005	8	2	31.3	51.0	14	3.4
2005	8	2	31.7	50.9	2	3.5
2005	8	6	34.7	53.2	10	4.1
2005	8	6	38.4	48.8	10	3.3
2005	8	7	27.9	53.8	48	4.4
2005	8	9	28.9	52.8	14	5.1
2005	8	9	32.4	49.7	59	4.4
2005	8	10	39.1	40.4	1	4.1
2005	8	11	32.8	49.7	10	3.6
2005	8	12	29.6	52.2	37	3.5
2005	8	12	32.0	48.9	37	4.1
2005	8	12	32.2	49.0	13	4.2
2005	8	13	32.8	54.8	10	4.0
2005	8	14	30.2	52.7	14	3.3
2005	8	15	31.0	50.1	15	3.4
2005	8	15	31.6	49.8	10	3.0
2005	8	16	38.6	54.1	10	3.8
2005	8	16	39.7	54.6	33	3.7
2005	8	17	29.0	52.2	14	3.5
2005	8	18	36.5	44.3	28	4.4
2005	8	19	28.3	54.2	52	4.5
2005	8	20	29.6	51.4	21	3.3
2005	8	21	30.9	51.4	51	4.4
2005	8	23	38.1	45.3	5	3.8
2005	8	23	38.2	45.7	2	3.6
2005	8	23	39.4	43.9	10	3.3
2005	8	26	37.2	54.4	10	4.1
2005	8	27	37.9	48.4	10	3.3
2005	8	28	28.3	52.0	6	4.3
2005	8	28	32.0	55.0	2	4.5
2005	8	29	29.4	51.0	10	3.7
2005	8	29	35.8	52.2	6	3.4
2005	8	29	36.5	42.4	9	3.8
2005	8	31	30.5	50.4	10	3.4
2005	8	31	36.1	53.7	2	4.0
2005	9	1	39.4	44.7	10	4.4
2005	9	4	27.0	53.2	10	3.7
2005	9	4	36.6	45.2	10	3.6
2005	9	4	36.8	45.6	14	3.4
2005	9	5	34.2	52.0	10	4.9
2005	9	7	33.6	48.9	15	3.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2005	9	8	31.0	50.0	6	3.9
2005	9	11	31.6	52.9	10	3.3
2005	9	12	32.3	54.5	10	3.3
2005	9	12	39.5	44.1	2	4.0
2005	9	14	38.0	47.3	5	4.3
2005	9	15	29.3	51.3	10	3.3
2005	9	16	33.9	53.9	10	4.0
2005	9	17	30.4	51.7	14	3.5
2005	9	18	39.8	41.9	6	4.0
2005	9	19	35.6	48.9	14	3.7
2005	9	20	37.2	54.8	10	3.4
2005	9	20	38.2	54.0	15	3.3
2005	9	22	32.7	49.6	19	3.4
2005	9	22	38.9	45.2	14	4.0
2005	9	23	27.5	53.7	10	3.9
2005	9	23	28.2	53.0	10	4.0
2005	9	23	28.9	52.3	15	4.3
2005	9	23	30.7	50.3	10	4.0
2005	9	24	38.5	52.1	10	5.1
2005	9	24	39.5	52.0	36	5.2
2005	9	25	33.6	45.7	10	4.5
2005	9	26	36.1	53.3	10	3.9
2005	9	26	37.3	47.7	10	5.2
2005	9	26	38.5	46.0	179	5.3
2005	9	29	39.1	46.1	10	4.0
2005	10	3	39.1	52.6	10	3.3
2005	10	4	30.2	51.2	33	3.8
2005	10	4	33.4	49.5	14	3.3
2005	10	4	37.6	42.6	3	4.1
2005	10	6	35.1	53.9	10	3.7
2005	10	9	27.6	53.7	67	3.8
2005	10	10	32.1	51.1	12	3.4
2005	10	11	29.5	51.5	10	3.3
2005	10	18	28.4	54.4	10	4.1
2005	10	20	29.2	52.0	6	4.6
2005	10	20	31.7	50.4	41	5.0
2005	10	20	40.0	42.4	10	4.0
2005	10	23	35.9	54.5	10	3.5
2005	10	23	36.1	54.9	10	4.0
2005	10	23	36.7	54.7	10	3.2
2005	10	24	27.7	51.8	10	4.1
2005	10	25	31.4	49.9	13	3.3
2005	10	28	27.6	54.3	33	3.4

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2005	10	31	34.3	45.7	10	4.6
2005	10	31	39.7	43.7	5	4.0
2005	11	1	32.0	51.0	10	3.6
2005	11	2	35.5	49.2	10	3.2
2005	11	2	39.2	44.1	5	4.1
2005	11	3	34.2	45.3	33	3.8
2005	11	4	32.5	48.2	33	4.2
2005	11	5	37.4	43.0	4	4.2
2005	11	6	37.2	43.0	35	4.0
2005	11	6	38.1	42.6	6	4.1
2005	11	8	34.4	46.8	10	3.6
2005	11	12	28.3	52.9	10	4.1
2005	11	12	29.4	52.9	10	3.8
2005	11	12	34.9	54.9	1	3.6
2005	11	15	35.0	50.0	10	3.2
2005	11	15	39.1	49.2	33	3.3
2005	11	16	40.0	50.9	10	3.9
2005	11	17	31.0	49.5	9	3.0
2005	11	18	39.9	41.4	5	4.1
2005	11	19	30.7	51.7	54	4.4
2005	11	21	40.0	40.8	6	4.2
2005	11	22	36.4	41.0	10	4.3
2005	11	23	32.6	49.6	5	3.6
2005	11	26	29.4	51.3	10	3.6
2005	11	28	36.7	44.6	10	4.1
2005	11	29	28.7	51.7	10	4.0
2005	11	29	29.6	52.0	9	3.7
2005	11	29	36.5	49.5	11	3.8
2005	11	29	37.4	54.4	27	4.6
2005	12	1	35.0	45.5	10	3.6
2005	12	3	33.2	48.5	2	3.3
2005	12	3	34.0	47.1	10	4.7
2005	12	4	35.9	48.7	33	4.1
2005	12	6	32.0	49.9	10	3.3
2005	12	6	38.5	43.3	28	4.1
2005	12	9	39.1	40.4	5	4.1
2005	12	9	39.5	54.8	10	3.1
2005	12	10	32.2	49.5	15	4.7
2005	12	14	38.6	53.5	15	3.2
2005	12	14	40.0	54.5	33	3.5
2005	12	15	32.5	49.0	8	3.5
2005	12	18	33.2	46.6	43	4.4
2005	12	20	38.2	49.2	10	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2005	12	22	36.1	53.4	4	4.0
2005	12	23	34.8	53.2	5	3.9
2005	12	23	38.3	45.4	10	3.8
2005	12	25	30.7	50.5	33	3.4
2005	12	25	31.5	50.1	65	4.3
2005	12	26	30.9	50.2	10	3.8
2005	12	26	31.4	50.0	10	4.4
2005	12	26	31.8	50.0	67	3.9
2005	12	26	31.9	50.0	5	3.3
2005	12	26	32.0	49.1	33	5.0
2005	12	26	32.3	50.3	15	3.6
2005	12	31	30.9	49.0	9	3.3
2006	1	6	26.9	54.5	39	4.5
2006	1	6	38.6	40.7	6	4.1
2006	1	6	39.5	44.8	10	4.2
2006	1	12	32.7	49.3	40	4.6
2006	1	12	34.5	48.9	60	4.8
2006	1	13	38.2	47.9	10	3.6
2006	1	15	33.1	48.5	1	4.1
2006	1	16	30.4	50.7	12	3.4
2006	1	16	34.8	45.1	10	4.4
2006	1	17	38.3	41.6	10	4.1
2006	1	20	35.6	49.0	10	4.7
2006	1	26	28.6	53.7	14	3.9
2006	1	27	39.1	40.4	1	3.8
2006	1	29	30.1	50.8	48	3.9
2006	1	29	38.0	42.5	8	3.3
2006	2	1	27.1	53.5	10	3.8
2006	2	2	27.5	54.1	46	4.2
2006	2	2	37.1	42.6	35	4.3
2006	2	3	27.6	54.3	16	3.8
2006	2	3	37.8	44.6	10	4.1
2006	2	5	29.7	51.9	10	3.9
2006	2	5	32.0	49.9	35	3.4
2006	2	8	35.4	44.2	28	3.9
2006	2	10	39.0	42.2	17	3.8
2006	2	12	28.9	47.7	10	4.5
2006	2	13	30.2	52.0	35	3.6
2006	2	16	30.1	49.5	10	3.3
2006	2	16	30.8	50.2	14	3.6
2006	2	17	36.4	54.5	3	3.9
2006	2	18	27.4	54.9	2	4.1
2006	2	20	28.1	54.7	42	4.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2006	2	22	36.1	50.4	14	3.2
2006	2	27	34.9	50.3	10	3.8
2006	2	28	28.3	53.9	25	4.7
2006	2	28	28.9	51.3	12	4.1
2006	3	1	27.7	53.1	10	4.5
2006	3	1	38.5	50.8	10	3.8
2006	3	1	40.0	50.9	35	4.7
2006	3	2	32.4	48.1	15	3.8
2006	3	3	27.9	51.8	11	4.2
2006	3	3	27.9	52.0	40	4.2
2006	3	3	28.8	52.5	19	3.9
2006	3	8	34.4	49.0	2	3.8
2006	3	10	36.9	45.2	10	3.8
2006	3	11	31.8	50.4	57	3.9
2006	3	12	37.4	44.2	18	4.1
2006	3	16	38.7	43.3	9	4.2
2006	3	18	29.3	51.2	3	3.4
2006	3	21	39.8	41.8	3	5.0
2006	3	23	38.7	42.5	8	3.3
2006	3	23	38.9	42.6	7	4.1
2006	3	25	27.0	53.6	47	4.0
2006	3	25	27.9	51.2	14	4.1
2006	3	25	29.0	52.2	14	3.8
2006	3	25	35.7	46.1	10	4.4
2006	3	26	34.9	47.0	10	3.8
2006	3	27	38.7	44.7	4	4.0
2006	3	28	32.3	49.1	9	3.8
2006	3	31	33.4	47.3	18	3.6
2006	3	31	33.5	48.7	9	6.1
2006	3	31	39.0	44.5	10	4.1
2006	4	3	35.2	52.0	10	3.8
2006	4	4	31.9	47.7	10	3.6
2006	4	5	33.5	46.1	10	4.7
2006	4	6	33.0	48.7	133	5.0
2006	4	6	34.0	48.5	14	4.6
2006	4	7	28.9	54.7	10	4.0
2006	4	11	31.9	51.0	10	3.4
2006	4	13	34.5	45.8	15	4.0
2006	4	19	31.0	51.4	10	4.2
2006	4	19	31.0	50.1	12	3.4
2006	4	20	27.9	54.3	10	3.9
2006	4	21	29.4	51.7	14	4.3
2006	4	23	28.5	53.0	17	3.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2006	4	24	33.5	47.0	10	4.2
2006	4	24	37.1	54.4	19	3.8
2006	4	25	29.5	52.2	18	4.1
2006	4	25	29.8	54.4	10	3.8
2006	4	29	35.2	53.2	14	4.0
2006	5	2	32.7	48.8	9	3.8
2006	5	4	31.6	50.1	37	4.6
2006	5	4	35.1	46.8	10	4.1
2006	5	6	27.8	54.0	36	3.7
2006	5	9	39.3	44.3	10	4.1
2006	5	10	30.8	49.8	10	4.0
2006	5	11	31.7	49.6	10	3.7
2006	5	13	37.2	45.0	10	4.0
2006	5	15	29.7	51.4	10	4.5
2006	5	18	34.9	43.6	29	4.2
2006	5	18	35.1	44.7	35	4.8
2006	5	19	28.6	52.4	4	4.1
2006	5	21	27.4	54.9	10	4.5
2006	5	21	37.7	44.3	2	4.4
2006	5	21	38.0	42.7	5	4.9
2006	5	23	39.8	49.0	35	3.8
2006	5	24	26.6	54.1	3	4.1
2006	5	25	38.3	47.5	15	3.8
2006	5	25	39.6	48.1	2	3.9
2006	5	26	38.5	45.1	2	4.1
2006	5	28	34.5	49.7	10	3.6
2006	5	29	27.3	53.8	47	4.0
2006	5	31	28.6	53.9	10	3.7
2006	6	2	24.4	49.1	10	4.2
2006	6	3	37.5	43.9	10	4.4
2006	6	3	39.1	40.3	10	4.7
2006	6	5	29.4	51.4	22	3.9
2006	6	5	32.7	48.4	11	4.2
2006	6	6	35.6	46.0	10	4.8
2006	6	7	26.6	53.5	10	3.6
2006	6	9	33.0	48.9	2	3.8
2006	6	9	39.7	40.7	5	4.1
2006	6	11	39.7	46.2	34	3.3
2006	6	14	32.3	48.8	43	4.0
2006	6	16	37.3	54.1	1	4.0
2006	6	18	32.6	47.8	10	3.4
2006	6	22	38.7	44.4	10	3.9
2006	6	22	38.7	43.4	4	4.1

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2006	6	23	27.5	54.3	27	5.1
2006	6	23	27.9	54.3	18	4.8
2006	6	25	31.0	50.1	35	4.0
2006	6	26	36.6	50.2	1	3.5
2006	6	26	36.8	49.9	14	3.5
2006	6	28	35.8	49.0	11	4.1
2006	6	29	29.0	51.3	10	3.8
2006	6	29	34.5	54.3	0	4.0
2006	7	1	37.3	45.0	12	3.2
2006	7	2	39.3	40.9	18	5.0
2006	7	3	32.0	49.5	10	3.5
2006	7	3	36.6	43.8	10	4.2
2006	7	8	28.8	51.9	10	3.9
2006	7	8	37.5	42.4	5	4.2
2006	7	10	29.2	51.3	34	3.5
2006	7	11	30.2	52.1	48	4.2
2006	7	12	27.6	53.5	10	3.8
2006	7	16	28.0	52.0	45	3.8
2006	7	18	30.9	51.3	35	4.5
2006	7	18	31.4	47.5	17	3.4
2006	7	19	27.4	52.8	35	4.1
2006	7	20	39.4	54.7	31	4.0
2006	7	22	33.4	50.8	10	4.4
2006	7	23	28.6	53.4	29	3.9
2006	7	24	32.7	49.7	17	4.3
2006	7	28	36.2	54.2	10	3.8
2006	7	29	38.5	44.9	15	4.1
2006	7	30	29.4	52.0	10	4.0
2006	8	5	38.9	42.5	10	3.6
2006	8	7	30.7	51.0	10	4.1
2006	8	7	32.3	48.7	7	3.5
2006	8	10	37.7	43.5	65	4.1
2006	8	11	34.2	48.8	1	4.4
2006	8	11	37.4	47.0	10	3.7
2006	8	12	38.5	45.6	1	4.1
2006	8	14	29.2	51.4	44	4.0
2006	8	14	32.3	50.0	13	3.7
2006	8	14	38.4	43.6	13	4.3
2006	8	15	37.1	54.5	11	3.8
2006	8	15	39.3	42.7	5	4.1
2006	8	16	32.4	49.5	10	4.1
2006	8	21	33.2	46.3	1	3.4
2006	8	23	36.5	51.0	2	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2006	8	28	35.3	53.3	2	4.0
2006	8	30	36.4	52.0	10	3.8
2006	9	3	30.0	50.7	1	3.3
2006	9	5	32.4	46.8	35	3.9
2006	9	7	39.8	48.4	10	3.9
2006	9	8	39.5	44.2	2	4.1
2006	9	11	39.0	41.2	7	4.1
2006	9	13	32.6	48.4	10	4.3
2006	9	14	29.2	51.3	5	4.8
2006	9	14	37.6	48.9	10	3.3
2006	9	16	35.2	45.5	16	4.3
2006	9	19	30.4	51.9	10	4.5
2006	9	21	32.4	47.7	10	3.3
2006	9	21	37.0	45.3	10	4.3
2006	9	23	27.5	52.6	20	4.5
2006	9	24	28.9	52.5	13	4.1
2006	9	24	32.8	50.0	10	3.4
2006	9	25	31.7	49.1	10	3.3
2006	9	26	31.9	50.7	23	4.9
2006	9	29	30.1	51.6	17	4.5
2006	10	11	29.7	51.6	10	3.4
2006	10	11	39.1	44.3	10	4.3
2006	10	12	31.5	49.7	35	3.7
2006	10	12	36.0	45.2	10	3.9
2006	10	12	39.9	54.8	45	5.3
2006	10	15	27.8	54.5	11	4.1
2006	10	15	36.9	44.9	7	3.3
2006	10	17	27.0	53.2	19	4.6
2006	10	18	38.6	43.5	10	4.2
2006	10	19	39.9	40.8	3	4.6
2006	10	21	39.6	42.8	1	4.2
2006	10	22	29.7	50.7	54	3.7
2006	10	23	28.5	51.1	34	4.1
2006	10	23	28.7	51.4	10	4.4
2006	10	23	29.6	50.7	10	3.9
2006	10	29	28.1	52.2	9	4.0
2006	10	31	30.2	50.1	35	3.8
2006	11	1	32.3	47.2	15	4.3
2006	11	2	30.9	51.5	4	3.7
2006	11	2	37.0	54.3	10	3.5
2006	11	3	28.0	51.1	40	4.0
2006	11	3	30.8	49.7	50	4.2
2006	11	5	37.6	48.9	6	4.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2006	11	7	32.0	49.1	10	4.3
2006	11	10	26.6	54.0	44	4.0
2006	11	11	32.4	49.7	49	4.5
2006	11	13	36.3	54.1	0	4.4
2006	11	14	28.0	51.8	11	4.1
2006	11	16	36.4	41.3	10	4.4
2006	11	16	38.3	42.0	12	4.2
2006	11	17	28.4	54.1	1	3.9
2006	11	23	39.9	42.7	10	4.5
2006	11	27	32.0	49.7	17	4.2
2006	11	29	29.1	52.6	5	4.4
2006	11	30	30.6	50.5	21	4.4
2006	12	2	38.5	45.2	6	4.5
2006	12	2	38.9	48.6	9	4.2
2006	12	6	39.0	41.2	9	4.1
2006	12	8	36.8	45.3	14	3.8
2006	12	11	37.8	49.3	10	3.9
2006	12	16	32.3	48.6	29	4.3
2006	12	17	32.8	49.4	7	3.6
2006	12	19	34.4	52.7	10	4.2
2006	12	20	35.8	51.9	3	4.3
2006	12	20	36.1	53.8	10	4.2
2006	12	26	39.3	43.9	10	3.9
2006	12	29	28.9	47.6	9	4.4
2007	1	1	31.4	49.9	10	3.3
2007	1	3	38.8	42.3	5	4.5
2007	1	4	38.2	44.0	3	4.1
2007	1	4	38.8	45.9	22	4.0
2007	1	5	26.8	54.6	9	3.7
2007	1	6	28.6	51.4	48	4.0
2007	1	7	28.1	52.2	10	3.9
2007	1	7	28.2	52.7	29	4.0
2007	1	7	32.8	47.5	20	4.2
2007	1	9	30.9	49.9	10	3.4
2007	1	11	37.7	47.9	10	3.9
2007	1	12	40.0	42.1	5	3.7
2007	1	16	30.5	51.7	10	3.4
2007	1	19	31.4	49.6	15	4.9
2007	1	19	31.5	49.7	60	4.3
2007	1	19	32.7	48.6	21	4.5
2007	1	19	32.8	48.7	54	4.3
2007	1	21	39.6	42.9	9	5.2
2007	1	22	31.6	50.8	10	3.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2007	1	22	32.7	50.0	10	3.3
2007	1	26	33.5	51.0	16	4.7
2007	1	26	38.7	40.1	9	4.9
2007	1	27	28.4	52.8	2	3.4
2007	2	3	36.8	54.6	10	4.4
2007	2	5	39.1	40.1	12	3.9
2007	2	7	27.2	52.9	29	4.0
2007	2	7	39.7	41.8	3	3.7
2007	2	10	33.5	45.9	43	4.1
2007	2	10	38.1	42.8	9	3.7
2007	2	12	27.3	53.6	15	3.9
2007	2	12	29.8	50.6	10	4.6
2007	2	12	38.6	43.1	5	3.8
2007	2	13	29.2	51.4	41	4.6
2007	2	16	29.5	51.4	10	3.5
2007	2	18	28.7	51.9	15	4.0
2007	2	22	31.7	50.9	14	4.8
2007	2	22	34.7	47.3	10	3.9
2007	2	22	35.0	46.7	21	3.9
2007	2	23	38.0	46.8	17	3.5
2007	2	26	35.8	52.1	4	3.9
2007	2	27	39.6	41.0	12	3.7
2007	2	27	39.9	41.2	5	3.8
2007	2	28	28.6	54.7	10	4.0
2007	3	1	39.9	40.4	6	3.7
2007	3	6	32.2	50.2	39	3.9
2007	3	8	39.0	40.5	14	5.0
2007	3	9	39.3	40.9	10	4.2
2007	3	11	31.2	48.9	48	3.8
2007	3	11	37.5	43.8	10	3.9
2007	3	12	38.9	41.8	10	3.8
2007	3	18	28.2	51.9	39	4.6
2007	3	19	39.5	44.8	3	4.0
2007	3	21	30.9	50.1	20	3.4
2007	3	21	37.6	42.5	8	3.9
2007	3	21	38.5	43.7	3	4.0
2007	3	23	27.6	53.7	4	3.6
2007	3	23	28.2	53.6	15	3.2
2007	3	23	30.5	50.7	3	3.8
2007	3	23	31.2	50.7	18	3.3
2007	3	23	36.8	45.0	5	4.1
2007	3	24	27.6	54.4	25	4.0
2007	3	25	26.6	53.8	23	3.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2007	3	25	27.1	54.0	48	3.9
2007	3	26	31.8	48.9	10	4.0
2007	3	26	38.4	44.4	10	4.2
2007	3	28	32.9	46.4	11	4.2
2007	3	28	35.8	49.4	4	3.9
2007	3	30	34.0	48.2	19	3.4
2007	3	31	38.0	44.7	18	3.8
2007	4	2	36.4	41.0	10	4.4
2007	4	3	35.9	53.1	2	4.0
2007	4	3	39.8	41.9	18	3.7
2007	4	9	38.9	44.6	4	4.4
2007	4	15	32.2	49.4	23	4.7
2007	4	15	39.0	44.9	1	4.1
2007	4	17	30.5	49.5	2	4.9
2007	4	17	32.1	46.8	10	3.5
2007	4	17	39.1	53.7	14	3.4
2007	4	17	39.7	54.2	10	3.4
2007	4	18	31.0	50.3	10	4.7
2007	4	22	27.8	52.5	41	3.8
2007	4	22	29.1	53.3	14	3.3
2007	4	22	37.4	44.4	3	3.8
2007	4	23	29.3	52.1	11	3.9
2007	4	23	29.7	51.5	5	4.3
2007	4	23	30.0	52.8	12	3.5
2007	4	23	30.9	49.4	10	3.3
2007	4	25	27.2	53.6	8	3.3
2007	4	26	27.8	52.5	3	3.7
2007	4	27	40.0	42.3	7	3.8
2007	4	28	39.5	40.5	13	3.7
2007	4	30	38.6	43.8	10	4.0
2007	5	1	32.3	49.8	26	3.5
2007	5	2	38.4	44.8	1	4.2
2007	5	5	38.8	42.3	6	4.5
2007	5	5	38.9	43.6	7	3.7
2007	5	7	37.6	44.0	10	4.1
2007	5	7	39.2	42.4	16	3.7
2007	5	7	40.0	41.7	12	4.4
2007	5	8	37.3	42.4	7	4.1
2007	5	9	38.3	45.3	6	4.0
2007	5	10	39.9	40.1	15	3.8
2007	5	11	34.4	54.0	6	4.7
2007	5	11	36.9	49.3	5	4.5
2007	5	12	27.3	54.7	4	3.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2007	5	13	39.6	40.2	9	3.7
2007	5	17	31.3	49.5	49	3.9
2007	5	18	27.8	53.4	33	4.9
2007	5	20	39.3	44.2	0	4.2
2007	5	20	39.6	41.1	14	3.7
2007	5	22	35.7	49.3	3	4.3
2007	5	24	28.3	52.3	15	4.1
2007	5	25	39.8	44.2	18	3.8
2007	5	28	30.0	51.5	33	4.2
2007	5	28	30.3	51.8	13	4.2
2007	5	29	29.4	52.5	36	4.2
2007	5	30	30.2	50.9	61	4.3
2007	5	30	39.1	41.4	13	3.9
2007	5	31	29.1	51.2	13	4.5
2007	6	1	31.8	49.7	49	3.5
2007	6	1	31.9	49.9	10	3.5
2007	6	1	39.4	40.9	10	4.0
2007	6	2	31.2	51.4	1	3.8
2007	6	2	39.0	43.9	0	4.1
2007	6	2	39.0	41.0	5	3.9
2007	6	3	26.6	54.1	45	4.1
2007	6	4	29.7	51.2	10	4.0
2007	6	4	36.4	51.3	4	4.1
2007	6	5	37.0	44.1	5	4.3
2007	6	8	27.7	55.0	18	3.9
2007	6	8	32.2	49.9	10	4.0
2007	6	9	32.5	49.7	8	4.3
2007	6	9	32.6	50.0	23	3.8
2007	6	9	34.1	48.5	14	3.5
2007	6	11	26.5	54.3	8	3.8
2007	6	12	31.6	50.2	10	3.9
2007	6	15	34.3	52.3	10	4.1
2007	6	17	27.1	53.1	3	3.6
2007	6	17	35.4	40.3	0	4.0
2007	6	18	28.4	52.8	16	4.3
2007	6	18	34.5	50.9	14	6.0
2007	6	19	27.1	54.2	8	3.8
2007	6	19	27.3	54.4	45	3.7
2007	6	20	31.3	50.2	43	3.9
2007	6	24	27.8	52.9	15	4.5
2007	6	24	37.5	42.7	7	3.8
2007	6	25	39.9	40.8	9	3.7
2007	6	26	29.6	51.5	10	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2007	6	27	39.4	40.1	4	3.9
2007	6	28	38.4	41.7	9	4.0
2007	6	28	39.4	41.9	6	3.8
2007	6	29	36.3	40.3	0	3.7
2007	7	3	30.5	50.7	10	3.6
2007	7	3	32.7	46.6	35	3.5
2007	7	6	37.3	45.2	10	4.0
2007	7	7	32.6	47.2	53	4.0
2007	7	8	36.3	44.9	41	4.3
2007	7	8	38.7	40.0	7	4.1
2007	7	9	37.0	45.1	12	3.8
2007	7	11	38.6	48.5	15	5.3
2007	7	15	39.3	41.3	2	3.9
2007	7	18	38.2	46.9	13	3.8
2007	7	19	31.0	49.8	29	4.2
2007	7	19	34.8	54.7	7	4.4
2007	7	20	31.3	50.9	18	3.9
2007	7	22	39.5	44.7	10	3.9
2007	7	23	39.1	42.1	9	3.8
2007	7	24	29.9	51.4	15	3.5
2007	7	26	31.7	50.3	10	3.6
2007	7	26	36.5	43.5	6	3.9
2007	7	27	39.4	40.8	0	4.1
2007	8	1	28.8	51.0	16	4.0
2007	8	1	31.9	49.4	10	3.5
2007	8	3	37.6	42.6	9	3.8
2007	8	5	33.1	48.0	5	3.8
2007	8	5	33.3	48.2	1	3.7
2007	8	13	32.6	49.0	4	3.3
2007	8	13	37.5	46.6	4	3.9
2007	8	14	31.2	48.1	27	4.0
2007	8	14	36.5	51.8	10	3.6
2007	8	15	27.9	51.9	10	4.2
2007	8	16	27.1	54.8	10	3.5
2007	8	17	28.8	47.6	9	4.4
2007	8	17	31.6	48.4	3	4.2
2007	8	17	32.7	47.9	9	4.0
2007	8	17	34.9	46.2	8	4.0
2007	8	20	31.4	49.8	51	3.8
2007	8	20	32.1	50.1	10	3.4
2007	8	20	37.6	49.1	48	4.0
2007	8	24	36.7	40.9	11	4.3
2007	8	24	39.7	41.3	12	3.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2007	8	25	30.0	50.8	10	4.1
2007	8	25	34.9	52.0	9	4.6
2007	8	25	39.3	41.1	13	5.3
2007	8	26	38.2	42.5	10	3.7
2007	8	26	39.9	41.0	4	4.2
2007	8	27	28.2	51.6	38	4.1
2007	8	27	31.7	50.4	76	3.6
2007	8	29	38.0	42.8	1	3.7
2007	8	30	37.1	54.4	12	4.2
2007	8	31	31.5	47.8	10	3.8
2007	9	1	38.9	41.9	10	3.8
2007	9	2	33.4	50.3	12	3.8
2007	9	4	31.1	50.1	10	3.6
2007	9	4	36.7	44.4	4	4.1
2007	9	5	28.2	52.8	18	3.8
2007	9	6	30.6	50.4	44	4.0
2007	9	8	32.7	49.3	1	3.4
2007	9	9	34.9	48.3	10	3.5
2007	9	10	32.1	48.8	0	3.5
2007	9	10	36.6	54.3	10	4.0
2007	9	15	32.3	49.0	24	3.8
2007	9	15	38.6	40.9	0	3.9
2007	9	17	39.4	40.0	1	4.2
2007	9	18	35.5	44.7	10	4.2
2007	9	19	37.4	50.1	3	4.0
2007	9	21	36.5	41.8	10	4.0
2007	9	21	37.3	44.3	12	4.5
2007	9	21	37.5	44.8	7	4.6
2007	9	21	38.8	40.2	8	3.8
2007	9	24	37.7	43.8	0	4.2
2007	9	25	30.7	49.9	10	3.3
2007	9	27	38.8	44.5	12	3.7
2007	9	29	37.6	48.9	4	4.4
2007	10	3	31.3	49.6	3	4.1
2007	10	6	39.5	40.7	0	4.3
2007	10	7	39.7	52.1	35	3.4
2007	10	8	34.9	53.1	16	4.0
2007	10	9	28.3	52.9	14	3.4
2007	10	9	32.1	49.4	10	4.0
2007	10	10	38.7	43.1	10	3.8
2007	10	10	38.8	43.7	8	3.8
2007	10	13	35.7	40.4	10	4.1
2007	10	14	27.7	52.9	10	4.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2007	10	16	27.4	52.8	34	4.0
2007	10	16	39.9	40.1	0	3.8
2007	10	17	39.9	40.7	5	3.8
2007	10	18	39.9	41.8	10	4.4
2007	10	19	32.5	47.8	5	3.5
2007	10	21	29.5	51.9	4	3.5
2007	10	21	29.7	51.2	8	4.1
2007	10	22	38.4	43.1	12	3.6
2007	10	24	31.9	49.7	10	3.5
2007	10	24	36.4	40.9	10	4.6
2007	10	24	39.7	43.7	1	3.9
2007	10	24	40.0	52.3	35	3.7
2007	10	25	29.1	51.3	10	3.4
2007	10	27	30.5	50.8	15	3.8
2007	10	29	31.3	51.8	15	3.5
2007	10	30	32.6	47.3	10	3.3
2007	10	30	33.4	46.9	14	3.3
2007	10	30	39.7	41.2	3	3.9
2007	11	2	37.2	42.9	3	4.4
2007	11	3	37.9	41.7	9	3.7
2007	11	4	35.1	53.2	10	3.9
2007	11	5	36.3	53.0	1	3.8
2007	11	6	28.4	53.5	11	4.0
2007	11	6	31.9	50.3	10	3.9
2007	11	6	39.8	49.0	13	3.8
2007	11	7	33.4	46.6	32	3.4
2007	11	11	27.7	53.7	36	4.3
2007	11	11	28.5	51.3	10	4.0
2007	11	12	27.8	54.0	10	3.8
2007	11	13	38.1	43.0	10	3.8
2007	11	14	38.9	40.5	2	3.7
2007	11	15	29.4	52.4	10	3.7
2007	11	15	39.1	42.0	2	4.2
2007	11	16	39.9	40.3	4	3.9
2007	11	18	28.3	54.1	3	4.3
2007	11	18	38.1	48.0	35	3.6
2007	11	19	30.5	51.8	3	4.9
2007	11	19	34.7	53.0	2	5.1
2007	11	19	37.4	54.3	7	3.8
2007	11	20	31.7	49.9	7	5.3
2007	11	20	32.7	49.2	13	4.0
2007	11	20	38.6	43.3	15	3.9
2007	11	20	39.9	42.6	8	3.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2007	11	20	40.0	40.8	9	3.7
2007	11	23	38.8	40.1	9	3.7
2007	11	29	34.1	46.8	5	4.9
2007	11	29	34.1	50.1	5	4.0
2007	12	1	38.2	46.4	2	4.8
2007	12	2	38.9	44.6	4	3.9
2007	12	4	28.3	52.5	12	3.4
2007	12	4	32.0	49.2	10	3.4
2007	12	4	39.5	40.2	3	4.1
2007	12	6	37.6	48.6	10	3.8
2007	12	9	28.7	52.2	18	4.0
2007	12	9	30.9	51.4	10	3.3
2007	12	10	38.6	40.8	3	3.8
2007	12	11	29.6	51.3	17	4.1
2007	12	12	30.6	50.4	8	3.9
2007	12	12	36.2	53.6	10	3.9
2007	12	14	37.3	47.6	14	4.7
2007	12	15	37.1	41.7	10	3.8
2007	12	16	32.6	47.7	42	4.2
2007	12	18	27.7	52.2	39	4.1
2007	12	18	28.2	52.2	18	3.9
2007	12	19	31.1	49.2	10	3.4
2007	12	19	33.0	48.9	12	3.7
2007	12	19	35.9	49.0	21	4.2
2007	12	20	36.8	54.6	3	4.2
2007	12	23	37.0	42.4	2	4.0
2007	12	24	38.1	42.9	0	3.8
2007	12	24	39.7	42.9	11	3.7
2007	12	25	27.3	54.8	12	4.0
2007	12	25	30.5	49.6	16	3.9
2007	12	25	31.0	48.5	22	3.6
2007	12	25	31.4	48.8	5	3.6
2007	12	25	40.0	40.4	10	3.7
2007	12	27	36.8	42.3	10	3.9
2007	12	29	27.4	52.6	7	3.8
2008	1	5	26.9	54.9	24	4.9
2008	1	5	27.8	54.7	14	4.2
2008	1	5	31.5	49.4	29	4.8
2008	1	6	37.4	54.5	14	4.4
2008	1	7	35.9	53.2	10	3.9
2008	1	7	39.6	41.2	8	3.7
2008	1	9	28.4	52.0	17	4.9
2008	1	9	33.6	48.9	2	3.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2008	1	9	33.7	46.0	18	3.8
2008	1	10	39.2	41.6	1	4.1
2008	1	12	32.6	48.1	10	3.6
2008	1	12	37.3	44.0	10	4.1
2008	1	12	39.6	43.8	10	4.0
2008	1	13	29.2	51.3	10	3.8
2008	1	13	37.7	42.8	2	4.0
2008	1	13	38.5	43.2	2	3.8
2008	1	15	38.2	41.8	6	3.7
2008	1	15	39.9	52.3	19	4.1
2008	1	16	39.2	43.8	8	3.7
2008	1	20	39.3	44.5	1	3.5
2008	1	21	30.4	50.9	32	4.3
2008	1	21	38.8	40.3	11	3.7
2008	1	22	39.7	44.0	31	4.0
2008	1	23	28.9	50.7	45	4.0
2008	1	23	29.3	51.3	39	3.9
2008	1	24	36.7	45.0	9	3.9
2008	1	25	36.3	40.9	10	4.1
2008	1	28	28.9	51.8	3	4.4
2008	1	28	34.8	44.2	10	3.7
2008	1	28	35.3	45.2	10	3.8
2008	1	28	37.7	43.9	2	4.3
2008	1	30	32.4	45.6	43	4.0
2008	1	30	33.1	45.8	15	3.4
2008	1	31	39.4	50.5	16	3.8
2008	1	31	39.9	51.1	42	4.0
2008	2	1	40.0	40.9	10	4.1
2008	2	2	26.4	53.0	10	5.2
2008	2	2	34.0	48.5	11	4.0
2008	2	4	27.1	54.0	35	3.8
2008	2	5	39.1	45.7	20	4.1
2008	2	7	27.7	53.0	10	3.4
2008	2	7	39.9	41.8	11	4.0
2008	2	8	27.9	53.8	16	4.9
2008	2	8	28.3	53.6	32	4.2
2008	2	9	28.3	54.0	19	3.6
2008	2	11	27.4	53.7	10	3.5
2008	2	13	31.8	51.0	10	5.3
2008	2	16	38.4	45.2	1	4.3
2008	2	17	34.2	45.5	13	3.6
2008	2	17	39.5	40.3	7	3.8
2008	2	18	38.1	43.1	10	3.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2008	2	19	29.0	47.6	10	4.6
2008	2	20	33.8	48.9	14	4.0
2008	2	20	39.8	40.4	1	3.7
2008	2	23	38.8	40.3	8	3.8
2008	2	24	34.3	44.6	33	3.4
2008	2	25	28.4	51.6	16	4.8
2008	2	27	36.2	40.1	10	4.0
2008	2	28	29.5	51.7	16	4.2
2008	2	28	37.3	44.7	10	4.0
2008	2	28	37.8	43.4	10	3.8
2008	3	2	32.9	46.5	10	3.5
2008	3	2	37.2	43.1	11	3.9
2008	3	2	38.1	43.7	14	3.8
2008	3	3	38.7	43.6	3	3.6
2008	3	4	32.5	48.5	12	3.8
2008	3	7	27.7	52.4	4	3.5
2008	3	8	36.3	54.1	10	4.0
2008	3	11	39.2	54.9	35	3.3
2008	3	14	38.9	44.6	8	4.3
2008	3	15	29.1	52.1	7	3.4
2008	3	17	33.0	47.4	16	4.3
2008	3	19	31.9	52.0	10	3.9
2008	3	19	38.3	41.3	4	3.8
2008	3	20	30.8	50.3	0	3.6
2008	3	20	35.8	45.1	10	4.3
2008	3	21	32.1	50.5	19	4.0
2008	3	22	33.5	47.6	6	4.7
2008	3	23	37.4	48.6	4	4.5
2008	3	23	39.0	40.5	1	4.0
2008	3	23	39.3	41.3	10	3.8
2008	3	24	29.3	51.4	12	3.4
2008	3	24	38.6	44.2	10	4.1
2008	3	25	35.3	50.7	10	4.0
2008	3	25	39.4	40.9	7	4.2
2008	3	26	30.2	50.8	10	4.0
2008	3	26	36.5	52.6	10	4.3
2008	3	27	35.8	48.9	10	3.9
2008	3	28	38.1	40.2	5	3.8
2008	3	28	38.5	40.6	0	4.1
2008	3	29	29.9	50.9	15	3.6
2008	3	29	30.5	51.4	18	3.5
2008	3	29	36.9	44.1	1	3.7
2008	3	30	36.3	41.0	3	3.6

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2008	3	30	39.8	43.7	5	3.3
2008	3	31	27.4	53.8	4	4.0
2008	3	31	37.8	43.7	10	3.7
2008	3	31	38.4	40.9	13	3.8
2008	4	1	31.2	46.1	35	4.4
2008	4	4	27.1	54.0	9	3.9
2008	4	5	38.7	43.8	5	4.1
2008	4	6	29.5	50.7	10	3.8
2008	4	6	32.4	50.3	10	3.4
2008	4	6	38.8	42.2	0	3.8
2008	4	6	39.4	42.5	9	3.8
2008	4	13	39.6	42.7	1	3.8
2008	4	14	27.8	52.8	0	4.1
2008	4	15	37.0	43.0	10	3.4
2008	4	15	37.3	45.0	10	3.9
2008	4	15	37.5	45.6	3	3.9
2008	4	17	40.0	40.8	4	4.1
2008	4	19	28.2	52.7	11	4.3
2008	4	20	26.6	54.6	18	3.8
2008	4	20	40.0	52.2	10	4.1
2008	4	21	34.1	45.6	10	3.4
2008	4	22	30.1	51.4	10	3.4
2008	4	22	38.4	45.4	10	4.0
2008	4	24	28.8	52.3	8	4.0
2008	4	24	35.7	52.6	10	3.6
2008	4	25	39.1	41.7	0	3.8
2008	4	26	29.9	50.9	15	3.9
2008	4	26	32.5	48.6	6	3.7
2008	4	28	27.6	52.5	16	3.9
2008	4	28	37.7	43.7	2	3.8
2008	4	29	28.1	54.2	10	3.7
2008	5	2	31.0	50.1	20	3.8
2008	5	5	28.4	54.1	46	5.2
2008	5	5	35.0	44.8	10	3.6
2008	5	6	38.3	42.3	3	3.8
2008	5	10	39.6	52.1	23	4.5
2008	5	11	27.0	54.0	10	3.9
2008	5	11	37.1	43.3	10	4.0
2008	5	13	36.2	40.4	14	4.2
2008	5	14	37.0	50.1	10	4.0
2008	5	15	32.1	49.4	15	3.4
2008	5	15	37.6	44.6	10	4.1
2008	5	19	32.2	50.2	10	4.7

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2008	5	19	38.5	40.6	7	3.8
2008	5	21	39.1	40.4	5	3.7
2008	5	24	36.1	44.5	14	4.1
2008	5	26	31.7	50.5	0	3.3
2008	5	26	38.6	43.2	6	4.1
2008	5	27	36.5	48.7	5	4.9
2008	5	27	39.7	43.7	10	4.0
2008	5	28	36.8	54.8	10	4.0
2008	5	28	39.1	44.1	6	4.1
2008	5	31	29.2	50.2	10	4.0
2008	6	1	27.2	54.5	5	3.6
2008	6	1	29.8	50.8	12	3.8
2008	6	3	32.4	48.6	10	5.1
2008	6	3	36.5	41.5	10	4.0
2008	6	7	37.2	47.7	10	3.8
2008	6	8	36.4	40.8	6	4.4
2008	6	8	37.4	43.6	10	4.4
2008	6	10	38.7	40.7	10	3.8
2008	6	10	39.3	49.0	32	4.1
2008	6	13	39.1	48.8	57	3.8
2008	6	15	27.1	54.0	10	3.8
2008	6	15	29.8	51.3	16	3.8
2008	6	16	26.9	54.0	35	4.0
2008	6	17	38.1	43.1	1	3.8
2008	6	20	38.4	44.8	3	4.0
2008	6	21	38.9	41.3	13	4.1
2008	6	22	39.8	40.7	4	3.9
2008	6	25	33.7	48.6	14	4.9
2008	6	25	37.6	43.9	1	4.2
2008	6	26	29.4	51.4	8	3.3
2008	6	26	30.6	50.5	11	3.4
2008	6	26	38.1	42.7	12	3.8
2008	6	27	32.5	48.1	10	3.8
2008	6	27	39.8	41.8	1	4.0
2008	6	28	38.9	40.3	16	3.8
2008	6	30	39.0	43.0	4	3.8
2008	7	12	33.4	47.3	1	4.9
2008	7	13	27.6	54.4	8	3.6
2008	7	13	37.8	48.2	7	4.1
2008	7	14	38.9	43.6	10	3.8
2008	7	15	29.5	52.0	0	3.8
2008	7	15	33.6	54.4	10	4.0
2008	7	16	31.4	47.3	35	3.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2008	7	16	35.8	53.2	10	4.1
2008	7	17	39.3	41.4	3	3.8
2008	7	18	28.4	51.8	10	3.8
2008	7	20	39.7	43.7	6	3.7
2008	7	21	35.8	48.9	11	3.8
2008	7	24	37.0	43.3	6	4.2
2008	7	26	27.1	53.5	8	4.6
2008	7	26	38.5	43.1	11	4.4
2008	7	28	39.1	41.7	1	4.1
2008	7	31	31.9	49.8	18	4.7
2008	8	2	29.4	49.2	24	4.0
2008	8	2	31.4	49.8	15	3.9
2008	8	4	26.7	54.8	10	4.0
2008	8	5	37.6	43.5	1	4.0
2008	8	7	36.5	42.7	15	4.1
2008	8	8	39.8	40.5	0	3.7
2008	8	11	29.9	50.9	17	3.8
2008	8	14	38.6	45.3	1	3.8
2008	8	15	28.3	52.9	5	4.1
2008	8	16	27.6	52.8	10	4.4
2008	8	16	35.1	46.5	7	3.9
2008	8	19	28.2	51.3	19	3.9
2008	8	19	39.0	42.4	12	3.7
2008	8	22	38.5	41.7	6	3.8
2008	8	23	38.5	54.1	17	4.3
2008	8	23	39.0	41.2	1	4.1
2008	8	23	39.8	54.1	35	4.8
2008	8	24	30.8	49.8	11	4.8
2008	8	25	27.6	55.0	10	4.1
2008	8	25	38.6	40.7	2	3.9
2008	8	25	39.9	40.1	1	3.8
2008	8	26	36.2	41.0	7	4.1
2008	8	26	38.1	42.9	16	3.7
2008	8	27	32.3	47.4	10	5.8
2008	8	28	38.3	42.4	1	3.8
2008	8	28	39.8	48.3	35	3.2
2008	9	1	28.1	52.5	16	4.1
2008	9	1	28.3	52.5	2	4.1
2008	9	2	29.5	52.0	15	3.8
2008	9	2	38.7	45.8	2	5.0
2008	9	4	38.4	45.1	10	3.9
2008	9	5	29.9	51.7	3	4.6
2008	9	6	26.5	53.8	10	4.0

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2008	9	6	33.9	48.1	2	3.6
2008	9	7	36.6	41.1	2	4.0
2008	9	7	39.9	43.3	10	3.7
2008	9	10	30.3	50.4	10	4.4
2008	9	13	27.8	52.1	7	4.2
2008	9	13	36.8	49.8	10	4.1
2008	9	14	39.0	50.3	10	3.8
2008	9	15	35.0	52.6	10	3.8
2008	9	17	39.2	41.4	0	3.8
2008	9	19	36.8	43.8	3	3.8
2008	9	20	33.5	45.9	4	4.8
2008	9	20	38.5	44.5	10	4.2
2008	9	22	29.7	51.3	4	4.3
2008	9	25	30.6	49.7	35	4.6
2008	9	26	35.8	49.0	3	4.3
2008	9	28	38.9	44.7	5	3.9
2008	9	28	39.8	44.0	10	3.7
2008	10	3	38.2	44.7	2	4.6
2008	10	3	39.7	41.4	5	3.9
2008	10	6	31.5	47.5	36	4.0
2008	10	9	28.3	52.9	15	3.7
2008	10	11	31.1	51.2	15	4.4
2008	10	12	32.0	48.9	11	4.2
2008	10	18	30.0	50.9	15	4.6
2008	10	19	28.8	51.7	15	4.6
2008	10	21	30.7	50.4	14	4.4
2008	10	24	29.1	51.3	20	5.2
2008	10	25	26.5	55.0	28	5.6
2008	10	25	39.9	53.6	26	4.0
2008	10	29	33.7	48.9	14	4.3
2008	11	8	28.4	52.6	11	3.8
2008	11	11	27.6	52.5	15	4.7
2008	11	23	33.3	48.0	7	3.3
2008	11	25	29.8	51.7	10	4.8
2008	11	26	28.1	53.5	20	4.3
2008	11	28	28.2	51.5	13	4.7
2008	11	28	32.4	48.8	29	3.7
2008	11	30	37.6	44.6	10	3.8
2008	12	1	30.2	50.5	15	3.9
2008	12	1	35.3	46.5	27	5.3
2008	12	5	27.0	53.3	36	4.0
2008	12	7	29.5	52.8	4	3.6
2008	12	13	40.0	54.0	35	4.2

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2008	12	16	28.3	52.9	10	3.5
2008	12	21	28.2	52.4	33	4.8
2008	12	24	39.5	52.0	10	4.0
2008	12	26	39.2	40.3	8	3.6
2009	1	7	32.0	49.7	2	4.0
2009	3	2	32.1	49.9	2	5.0
2009	3	11	39.0	41.9	5	4.7
2009	4	4	31.8	50.2	10	4.7
2009	4	7	32.6	47.8	10	5.0
2009	4	15	30.7	50.1	9	4.8
2009	4	25	33.1	48.8	16	4.9
2009	5	1	29.2	51.6	34	4.6
2009	5	26	27.3	53.6	14	4.6
2009	5	26	34.0	48.5	5	5.2
2009	7	18	35.9	43.4	25	5.1
2009	8	9	27.9	53.2	23	4.4
2009	8	13	31.6	49.9	14	4.4
2009	8	14	36.5	52.1	6	4.3
2009	8	30	33.2	46.4	15	5.1
2009	10	4	31.9	49.5	9	5.4
2009	10	13	34.9	46.9	13	5.4
2009	11	18	31.6	50.9	37	5.2
2009	12	2	28.7	53.7	10	4.9
2009	12	12	27.6	53.3	12	5.2
2010	1	10	35.7	49.0	4	4.2
2010	1	13	26.7	53.6	10	5.1
2010	1	18	32.5	47.1	42	4.7
2010	1	19	29.6	51.5	10	4.7
2010	1	20	35.8	52.9	5	5.0
2010	2	2	37.9	46.8	10	4.9
2010	2	7	27.7	54.2	36	4.7
2010	2	8	28.1	54.0	26	4.6
2010	2	11	33.4	47.3	12	4.9
2010	2	18	30.8	50.2	16	5.2
2010	2	23	32.5	48.3	35	5.6
2010	3	4	37.4	54.4	28	5.0
2010	4	1	27.3	53.7	5	4.0
2010	4	13	30.7	51.4	15	5.0
2010	4	21	39.8	51.2	10	4.7
2010	4	27	27.2	55.0	21	5.4
2010	4	28	35.9	49.1	14	4.1
2010	5	17	31.4	49.6	35	4.1
2010	5	22	39.3	41.2	3	4.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2010	6	20	27.9	54.4	10	4.8
2010	7	18	33.8	48.1	15	4.4
2010	7	20	27.0	53.9	10	5.8
2010	8	6	29.3	51.0	8	4.4
2010	8	22	23.8	49.1	38	4.2
2010	8	27	35.5	54.5	7	5.7
2010	8	28	39.5	54.4	5	5.2
2010	9	7	27.0	54.5	30	5.6
2010	9	7	39.5	40.2	5	4.3
2010	9	8	27.7	53.0	18	5.0
2010	9	8	36.8	49.5	5	4.1
2010	9	27	29.7	51.7	22	5.8
2010	10	22	38.3	49.1	26	5.4
2010	10	28	29.9	51.2	33	4.8
2010	11	1	36.1	43.2	18	3.2
2010	11	2	32.6	49.9	6	3.3
2010	11	2	36.6	54.8	2	3.0
2010	11	2	37.4	42.8	5	3.4
2010	11	2	29.6	51.5	5	3.9
2010	11	3	30.8	50.6	20	3.1
2010	11	4	35.6	49.9	3	3.4
2010	11	4	36.1	53.7	5	3.1
2010	11	5	27.0	54.4	15	4.2
2010	11	5	31.0	49.9	11	3.2
2010	11	6	33.4	48.9	5	5.2
2010	11	8	36.2	43.9	8	3.3
2010	11	8	35.1	44.7	1	3.8
2010	11	8	26.8	53.8	11	3.9
2010	11	9	36.2	52.1	9	3.2
2010	11	9	27.5	53.0	15	3.1
2010	11	10	36.4	52.7	4	3.2
2010	11	11	27.5	54.5	34	3.0
2010	11	12	30.3	50.7	8	3.2
2010	11	13	33.1	46.2	35	3.2
2010	11	13	37.3	53.9	6	3.0
2010	11	14	28.4	52.9	36	3.0
2010	11	15	35.5	54.5	5	3.1
2010	11	16	35.5	47.6	15	4.2
2010	11	17	30.9	51.2	3	3.1
2010	11	18	36.5	40.9	8	4.0
2010	11	18	30.7	48.3	6	3.2
2010	11	19	30.1	50.2	11	3.3
2010	11	21	34.7	52.8	20	4.5

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2010	11	22	37.2	50.5	5	3.3
2010	11	22	37.0	42.9	5	4.4
2010	11	22	28.3	51.9	2	3.0
2010	11	23	37.2	42.6	5	3.7
2010	11	23	36.5	49.2	7	3.0
2010	11	25	37.5	42.4	5	3.5
2010	11	25	36.2	53.2	12	3.3
2010	11	26	31.3	49.7	11	3.8
2010	11	26	28.1	52.6	0	5.5
2010	11	26	28.1	51.7	10	4.9
2010	11	26	29.0	52.1	6	5.0
2010	11	26	32.9	51.5	3	3.5
2010	11	27	30.2	50.4	4	3.4
2010	11	28	32.9	46.0	19	3.5
2010	11	28	35.4	54.5	3	3.0
2010	11	29	35.0	51.5	11	3.5
2010	11	29	36.8	54.8	5	3.2
2010	12	2	27.7	53.2	19	3.1
2010	12	3	35.9	44.1	10	3.0
2010	12	6	35.9	53.3	5	3.1
2010	12	6	32.7	45.7	21	3.1
2010	12	8	32.5	48.5	5	3.6
2010	12	8	32.6	45.5	3	3.3
2010	12	8	32.5	49.3	4	3.1
2010	12	9	36.5	40.3	7	3.8
2010	12	9	28.6	52.1	40	4.9
2010	12	9	26.6	53.4	10	3.2
2010	12	11	28.3	52.1	8	3.1
2010	12	11	36.6	42.3	11	3.7
2010	12	14	30.8	48.2	35	3.3
2010	12	15	33.0	54.1	5	3.4
2010	12	15	30.6	49.8	13	3.9
2010	12	15	27.5	53.2	23	3.1
2010	12	15	31.5	50.3	11	3.3
2010	12	15	27.0	54.8	12	3.4
2010	12	15	37.4	54.6	8	3.6
2010	12	16	30.6	51.5	9	3.6
2010	12	16	27.8	54.4	28	3.5
2010	12	18	34.0	47.2	26	3.0
2010	12	19	31.9	48.1	8	3.1
2010	12	21	28.4	53.7	23	3.0
2010	12	24	37.2	42.3	5	3.2
2010	12	27	26.9	53.9	20	3.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2010	12	28	29.5	53.0	7	3.2
2011	1	2	36.8	44.0	5	4.0
2011	1	2	30.5	51.8	33	4.2
2011	1	2	36.7	43.3	10	4.4
2011	1	3	30.3	49.6	10	4.7
2011	1	5	30.2	51.7	0	5.8
2011	1	7	36.5	42.1	8	3.5
2011	1	8	37.0	44.4	5	3.6
2011	1	9	27.7	54.1	33	4.5
2011	1	9	37.4	44.1	15	3.4
2011	1	11	37.3	42.9	5	3.8
2011	1	13	31.3	47.0	10	3.3
2011	1	13	35.5	44.9	28	3.0
2011	1	13	29.3	51.4	4	3.3
2011	1	16	36.8	50.7	6	3.5
2011	1	16	35.0	50.1	4	3.4
2011	1	16	28.3	54.0	9	3.5
2011	1	18	37.3	40.3	8	3.1
2011	1	19	27.1	54.1	5	3.2
2011	1	20	29.5	52.1	14	4.2
2011	1	22	29.6	51.5	5	3.0
2011	1	22	37.3	42.5	5	3.8
2011	1	23	34.8	51.9	5	3.2
2011	1	24	30.9	50.1	6	3.1
2011	1	28	35.8	53.2	5	3.3
2011	1	29	27.4	52.8	25	3.2
2011	1	30	36.4	41.9	8	3.8
2011	1	30	27.0	53.5	18	4.6
2011	1	31	32.1	50.7	5	3.4
2011	2	1	28.6	51.4	5	3.2
2011	2	6	37.2	40.7	10	3.5
2011	2	7	31.1	47.6	23	4.4
2011	2	7	37.4	54.6	8	3.7
2011	2	8	35.6	50.1	5	3.1
2011	2	9	37.2	41.3	21	3.5
2011	2	9	29.3	51.3	5	3.4
2011	2	10	36.0	41.9	33	4.0
2011	2	10	36.4	40.8	11	3.7
2011	2	12	34.3	52.3	5	3.3
2011	2	12	34.0	45.1	7	3.1
2011	2	13	29.2	52.6	10	4.2
2011	2	17	30.2	50.0	35	3.2
2011	2	19	26.9	54.4	7	3.8

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2011	2	20	37.0	45.3	5	3.2
2011	2	20	35.5	51.8	5	4.0
2011	2	20	35.5	53.4	5	3.3
2011	2	23	37.1	40.5	27	3.5
2011	2	23	37.3	42.7	8	3.2
2011	2	23	30.1	50.0	5	3.3
2011	2	24	30.3	50.2	5	3.1
2011	2	24	37.3	50.5	5	3.0
2011	2	25	34.1	47.5	14	4.2
2011	2	25	36.4	52.2	5	3.0
2011	2	26	33.4	45.8	4	3.9
2011	2	27	34.7	47.9	42	4.2
2011	2	28	35.6	49.0	8	3.3
2011	2	28	36.4	45.7	9	4.0
2011	2	28	32.0	49.8	6	3.7
2011	2	28	36.7	44.1	14	3.3
2011	3	1	34.8	52.6	6	3.2
2011	3	1	32.9	47.7	6	3.4
2011	3	2	27.2	54.3	7	3.4
2011	3	4	36.7	42.7	22	3.8
2011	3	5	29.5	55.0	11	5.8
2011	3	5	29.9	51.1	0	5.6
2011	3	5	27.6	52.4	4	3.4
2011	3	6	27.2	55.0	5	3.4
2011	3	7	36.0	54.8	8	3.3
2011	3	7	30.8	48.2	10	3.2
2011	3	11	37.3	50.5	2	3.1
2011	3	12	35.5	49.7	6	3.1
2011	3	12	35.5	54.5	4	3.2
2011	3	13	32.6	47.2	5	3.1
2011	3	14	29.5	51.0	18	3.4
2011	3	15	36.8	50.5	7	3.9
2011	3	16	35.0	45.2	7	4.0
2011	3	17	29.8	50.5	5	3.6
2011	3	17	34.2	43.9	18	3.0
2011	3	18	31.5	49.9	30	3.3
2011	3	18	35.4	46.6	6	3.0
2011	3	20	37.2	44.1	12	3.6
2011	3	21	31.2	50.4	5	3.1
2011	3	23	36.0	44.7	20	3.1
2011	3	24	35.1	51.1	3	3.0
2011	3	24	29.3	50.4	9	3.2
2011	3	26	36.5	42.1	18	3.3

Year	Month	Day	Lat °	Long °	Depth (km)	Magnitude (M_w)
2011	3	28	32.4	49.2	3	3.3
2011	3	30	37.0	41.5	11	3.4
2011	4	1	37.1	54.5	5	3.0
2011	4	4	33.1	46.3	10	3.3
2011	4	5	32.3	49.0	13	3.3
2011	4	6	35.5	52.0	5	3.8
2011	4	6	34.7	45.3	20	4.5
2011	4	7	33.0	48.7	19	3.8
2011	4	7	34.4	45.6	18	4.6
2011	4	7	34.5	51.3	7	3.5
2011	4	7	35.6	48.9	5	3.0
2011	4	8	36.4	54.0	6	3.0
2011	4	9	30.8	51.3	7	3.1
2011	4	9	30.2	50.2	17	3.3
2011	4	11	34.5	50.8	4	4.0
2011	4	13	37.3	54.0	5	3.0
2011	4	13	28.6	53.6	24	3.4
2011	4	13	35.0	53.9	12	3.2
2011	4	17	27.7	54.6	17	3.7
2011	4	18	31.2	47.9	6	3.4
2011	4	18	29.0	51.2	30	3.0
2011	4	19	31.4	49.4	2	3.7
2011	4	21	33.6	52.4	2	4.0
2011	4	22	31.9	50.2	6	3.5
2011	4	24	36.2	45.5	16	3.7
2011	4	25	29.6	51.6	100	4.4
2011	4	26	30.8	50.4	15	3.0
2011	4	26	32.5	48.4	5	3.0
2011	4	27	30.9	50.1	12	3.1
2011	4	29	34.8	44.8	21	3.1
2011	4	29	35.2	44.8	17	3.3
2011	5	1	34.9	44.6	1	3.1
2011	5	3	29.6	51.6	3	3.2
2011	5	3	27.7	53.9	27	3.3
2011	5	6	36.2	53.3	5	3.0
2011	5	6	33.9	45.2	3	3.2
2011	5	8	34.6	52.4	5	3.1
2011	5	8	30.7	50.4	17	4.0
2011	5	9	28.2	51.3	27	3.2
2011	5	9	28.2	54.4	5	3.1
2011	5	11	31.8	48.3	10	3.2
2011	5	12	33.2	49.9	3	4.1
2011	5	12	30.9	51.3	11	4.8